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Amateur Radio

CQ

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WPX SSB Contest All-Time World Record Holders

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THE RADIO AMATEUR'S JOURNAL

KENWOOD

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DX-cellence!

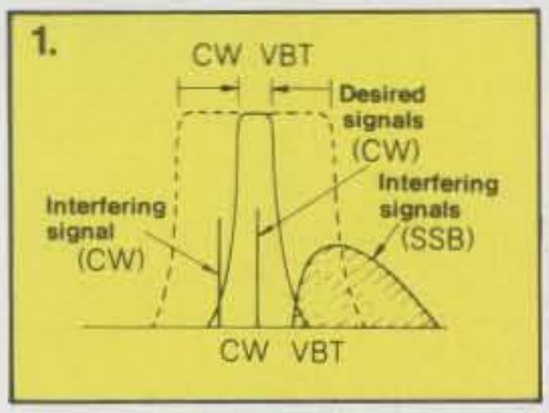
#1 Rated HF!

TS-940S

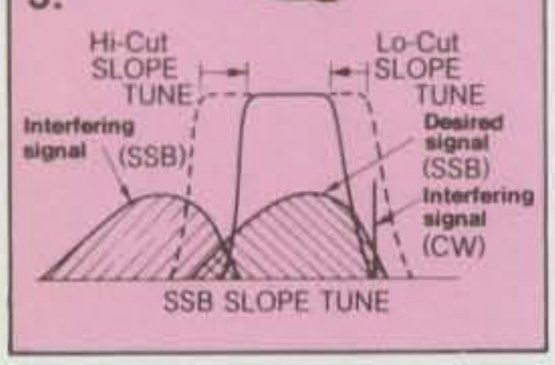
Competition class HF transceiver

TS-940S—the standard of performance by which all other transceivers are judged. Pushing the state-of-the-art in HF transceiver design and construction, no one has been able to match the TS-940S in performance, value and reliability. The product reviews glow with superlatives, and the field-proven performance shows that the TS-940S is "The Number One Rated HF Transceiver!"

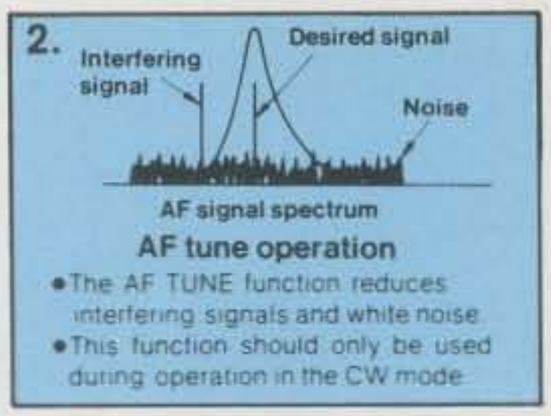
- **100% duty cycle transmitter.** Kenwood specifies transmit duty cycle ***time.*** The TS-940S is guaranteed to operate at full power output for periods ***exceeding one hour.*** (14.250 MHz, CW, 110 watts.) Perfect for RTTY, SSTV, and other long-duration modes.
- **First with a full one-year limited warranty.**
- **Extremely stable phase locked loop (PLL) VFO.** Reference frequency accuracy is measured in ***parts per million!***



1) CW Variable Bandwidth Tuning. Vary the passband width continuously in the CW, FSK, and AM modes, without affecting the center frequency. This effectively minimizes QRM from nearby SSB and CW signals.



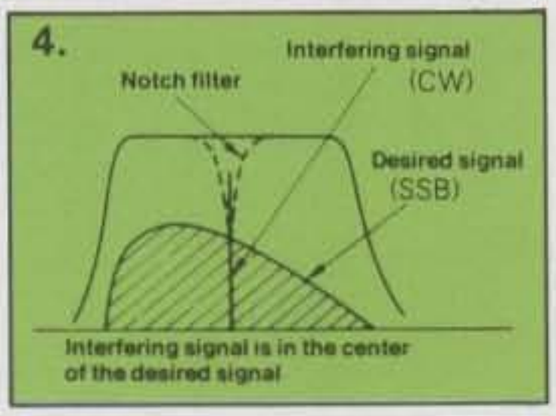
3) SSB Slope Tuning. Operating in the LSB and USB modes, this front panel control allows independent, continuously variable adjustment of the high or low frequency slopes of the IF passband. The LCD sub display illustrates the filtering position.



AF tune operation

- The AF TUNE function reduces interfering signals and white noise.
- This function should only be used during operation in the CW mode.

2) AF Tune. Enabled with the push of a button, this CW interference fighter inserts a tunable, three pole active filter between the SSB/CW demodulator and the audio amplifier. During CW QSOs, this control can be used to reduce interfering signals and noise, and peaks audio frequency response for optimum CW performance.



4) IF Notch Filter. The tunable notch filter sharply attenuates interfering signals by as much as 40 dB. As shown here, the interfering signal is reduced, while the desired signal remains unaffected. The notch filter works in all modes except FM.

- **Complete all band, all mode transceiver with general coverage receiver.** Receiver covers 150 kHz-30 MHz. All modes built-in: AM, FM, CW, FSK, LSB, USB.
- **Superb, human engineered front panel layout for the DX-minded or contesting ham.** Large fluorescent tube main display with dimmer; direct keyboard input of frequency; flywheel type main tuning knob with optical encoder mechanism all combine to make the TS-940S a joy to operate.
- **One-touch frequency check (T-F SET) during split operations.**
- **Unique LCD sub display indicates VFO, graphic indication of VBT and SSB Slope tuning, and time.**
- **Simple one step mode changing with CW announcement.**
- **Other vital operating functions.** Selectable semi or full break-in CW (QSK), RIT/XIT, all mode squelch, RF attenuator, filter select switch, selectable AGC, CW variable pitch control, speech processor, and RF power output control, programmable band scan or 40 channel memory scan.

Optional accessories:
• AT-940 full range (160-10m) automatic antenna tuner • SP-940 external speaker with audio filtering • YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters; YK-88A-1 (6 kHz) AM filter • VS-1 voice synthesizer • SO-1 temperature compensated crystal oscillator • MC-43S UP/DOWN hand mic. • MC-60A, MC-80, MC-85 deluxe base station mics. • PC-1A phone patch • TL-922A linear amplifier • SM-220 station monitor • BS-8 pan display • SW-200A and SW-2000 SWR and power meters • IF-232C/IF-10B computer interface.

Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications, features, and prices are subject to change without notice or obligation.

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NEW RZ-1 Wide-Band Receiver.

Hear it All!

R-5000
R-2000
High performance receivers.

Scan the entire frequency range from 100 kHz to 905 MHz with Kenwood's R-5000, R-2000 and RZ-1. Listen in on foreign music, news, and commentary. Monitor local police, fire, and other public safety services, as well as the Marine channels, and the many other services 50 MHz and above.

(The VHF converter options must be used in the R-5000 and R-2000.)

R-5000

The R-5000 is a high performance, top-of-the-line receiver, with 100 memory channels, and direct keyboard or main dial tuning—makes station selection super easy! Other useful features include programmable scanning, large, built-in speaker, 110 volt AC or 12 volt DC operation (with optional DCK-2 cable), VHF capability (108-174 MHz) with the VC-20 option, dual 24-hour clocks with timer, and even voice frequency readout with the VS-1 option.

R-2000

The R-2000 is an all band, all mode receiver with 10 memory channels and many deluxe features such as programmable scanning, dual 24-hour clocks with timer, all-mode squelch and noise blankers, a large, front-mounted speaker, 110 volt AC or 12 volt DC operation (with the DCK-1 cable kit), and 118-174 MHz VHF capability with VC-10 option.

RZ-1
Wide-band scanning receiver

The RZ-1 wide-band, scanning receiver covers 500 kHz-905 MHz, in AM, and narrow or wideband FM. The automatic mode selection function makes listening easier. One hundred memory channels with message and band marker, direct keyboard or VFO frequency entry, and versatile scanning functions, such as memory channel and band scan, with four types of scan stop. The RZ-1 is a 12 volt DC operated, compact unit, with built-in speaker, front-mounted phones jack, switchable AGC, squelch for narrow FM, illuminated keys, and a "beeper" to confirm keyboard operation.

Optional Accessory
- **PG-2N** Extra DC cable

Optional Accessories

R-2000:
- **VC-10** VHF converter
- **DCK-1** DC cable kit for 12 volt DC use.

R-5000:
- **VC-20** VHF converter
- **VS-1** Voice module
- **DCK-2** for 12 volt DC operation
- **YK-88A-1** AM filter
- **YK-88SN** SSB filter
- **YK-88C** CW filter
- **MB-430** Mounting bracket.

Other Accessories:
- **SP-430** External speaker
- **SP-41** Compact mobile speaker
- **SP-50B** Mobile speaker
- **HS-5** Deluxe headphones
- **HS-6** Lightweight headphones
- **HS-7** Mini-headphones.

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TH-55AT 1200 MHz Here Now!

Compact Breakthrough!

TH-25AT/45AT

New Pocket Portable Transceivers

The all-new TH-25 Series of pocket transceivers is here! Wide-band frequency coverage, LCD display, 5 watt option, plus...

- Frequency coverage: **TH-25AT:** 141-163 MHz (Rx); 144-148 MHz (Tx). (Modifiable for MARS/CAP. Permits required.)
  TH-45AT: 438-450 MHz.
- Automatic Power Control (APC) circuit for reliable RF output and final protection.
- 14 memories; two for **any** "odd split" (5 kHz steps).
- Automatic offset selection (TH-25AT).
- 5 Watts from 12 VDC or PB-8 battery pack.
- Large multi-function LCD display.
- Rotary dial selects memory, frequency, CTCSS and scan direction.
- T-ALERT for quiet monitoring. Tone Alert beeps when squelch is opened.
- Band scan and memory scan.
- Automatic "power off" circuit.
- Water resistant.
- CTCSS encoder/decoder optional (TSU-6).
- **Supplied accessories:** StubbyDuk, PB-6 battery pack for 2.5 watts output, wall charger, belt hook, wrist strap, water resistant dust caps.

Optional accessories:

• **PB-5** 7.2 V, 200 mAh NiCd pack for 2.5 W output • **PB-6** 7.2 V, 600 mAh NiCd pack • **PB-7** 7.2 V, 1100 mAh NiCd pack • **PB-8** 12 V, 600 mAh NiCd for 5 W output • **PB-9** 7.2 V, 600 mAh NiCd with built-in charger • **BC-10** Compact charger • **BC-11** Rapid charger • **BT-6** AAA battery case • **DC-1/PG-2V** DC adapter • **HMC-2** Headset with VOX and PTT • **SC-14, 15, 16** Soft cases • **SMC-30/31** Speaker mics. • **TSU-6** CTCSS decode unit • **WR-1** Water resistant bag

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CQ The Radio Amateur's Journal

ON THE COVER: Certain facts in life are givens. In fact, all of these people are Givens—the Givens family of Pleasant Shade, Tennessee. This amateur radio family consists of Dad, Ricky, KA4BOT; Mom, Vickey, KC4DQT; and the kids, Hope (purple shirt), KC4DQV, and Robin (white shirt), KC4DQW. Photo by Larry Mulvehill, WB2ZPI.

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Zero Bias

AN EDITORIAL

The first three letters I received in response to my January editorial were predictable and sort of covered in February's "Zero Bias." The first declared that all of the hoopla over no-code was in fact a plot for the amateur radio industry to rake in millions. The second was a statement of observation: If young people didn't want amateur radio then ignore them and go after more senior citizens, retirees, and others in the median age group and older. While I heartily agree that we should get more of everybody, getting a large influx of even older people would just put the median age even higher. The third letter repeats the old saw that learning the code is good for you and it should separate us from other services. It also includes the phrase "no pain, no gain."

From what I can judge, in the last 60 to 90 days there has been a lot of activity in amateur circles over the concept of a no-code license. To date no one nor any group has actually put forth a proposal that would spell out such a license in detail. Since there has been no proposal, it sort of leaves the "anti" group up in limbo as to what to respond to. It's really hard to be against something that in fact doesn't exist at the moment.

What is building up are emotions and how we "feel" about the issues involved. Some feel that their traditional beliefs of what amateur radio is are being eroded or chopped away just for the sake of numbers. Nobody wants to feel that all of his effort in memorizing questions and hours of code practice were wasted. It is the traditional aspect of pain in obtaining an amateur radio license that is the most quoted. Well, the pain wasn't wasted entirely. You're here now, occupying the bands and still carrying on. I think that many of us who can be honest with ourselves will admit that we view an amateur radio exam as a hurdle to overcome and not a measure of what we need to know in order to operate a station in an effective and legal manner.

I've heard amateurs discussing other amateurs as being bad operators and knowing nothing (as if *they* did). When I checked some of the calls in question, they were Extra class licenses. These people may or may not be good operators or they may just be good test takers. How dare they find it easy to progress to (or start out as) an Extra class license without knowing anything. Perhaps they even went through the pain and still didn't know anything. That would make it somewhat better, but in reality you don't really have to comprehend the material at all. Somewhere along the line we really became attached to the *process* of amateur radio rather than the *practice*. Whether it was the panic of "Incentive Licensing" or something else, the rites of passage are emotionally more important to a lot of us than being crass enough to actually comprehend the material. This, of course, presumes that the testing material is relevant.

As this is being written, the ARRL Board of Directors is about to meet at League headquarters, and it's a safe bet that the no-code issue will be somewhere on the agenda. Emotions will be high, and it's a problem to deal with a defense, attack, or support for something that doesn't really exist at this time. The Board must decide if (A) they're thinking in a leadership mode or (B) reacting to members' responses. It's a very important time for the board and in a sense for amateur radio. The board really has to differentiate or qualify whom it represents. If the ARRL wishes to lead in amateur radio and in fact represent the entire amateur radio population, then some almost 300,000 licensed amateurs must be considered in addition to 125,000 to 150,000 League members. Clearly there are more nonmembers than members. If the League wishes to continue to "speak" for amateur radio, then they will have to come up with a rationale better than "responding to members' wishes," or they do not speak for all amateurs. The board is in a position to lead, if they choose, and not necessarily follow. Leading includes what's good for all amateurs and for amateur radio as a whole throughout the years to come.

To be perfectly facetious about it, if board members only respond to members' wishes, we (not an editorial we, but a membership we; I'm a Life Member) could dispense with the board and print initiatives in *QST*, and every member could mail back a reply—a true democratic referendum. It could be done a lot cheaper than through board meetings and directors' expenses. Don't cringe, guys. I'm just kidding.

While the above idea might be proffered with tongue in cheek, the basic concept is that the board should be more than a rubber stamp for the membership if it is to speak for all of us. The membership's views may or may not coincide with what's good for amateur radio, especially ten years from now. However, the board and the League president could take the initiative in leading amateur radio forward. Future generations rarely remember the arguments leading up to some big change. They generally only remember who took the credit for the change. It would be nice to be remembered as the people who turned around amateur radio.

Probably the first step should be to figure out a new name for this entry class of license—something other than no-code. There isn't enough antacid around to neutralize the emotional bile that term brings up with some of you. We have to continually remind ourselves and remember that absolutely no one has ever advocated a code-free HF license. The denizens of HF are safe from the hoards of our fellow Americans, washed or unwashed, who want to defile the airways with signal reports, contest scores, weather reports, and who knows what else "those kinds" of people like to do.

All anyone is trying to do is figure out how to interest more people, preferably young people, in what we consider a wonderful, fun-filled hobby. If the rationale of CW is just a hurdle of pain "to see if they've got the right stuff," then something is wrong. If that's the case, we should add the ability to type to the exam. After all, with all of our keyboards these days it's apparent that a lot of us also take what seems forever to load a buffer or to "hunt and peck" our way through a QSO. Why not simply add to the 20 WPM exam for Extra a typing test of, say, 60 WPM? Fifty WPM could do for Advanced, and so on. It will get harder and harder to find a job as a CW operator, but you can generally make a living by typing.

Before emotions really boil over and whatever is left of reason flies out the door, let's really look at what people are trying to accomplish. People are attempting to keep amateur radio alive and well and provide a future for the hobby. If you are of a mind to think of amateur radio as a *service*, then substitute the word in your mind, but remember what most of us do is definable as a hobby. No one is out to kill CW as a means of communication on the HF bands. It can and should be used by anyone who wants to use it. However, on the bands above 30 MHz typically there is very little CW activity outside of a relatively few DXers and repeater IDs. This is the area of concern for a noncontinuous-wave license. There is a real rationale for questioning the need for a specialized skill requirement in an area where it isn't used. The "hurdle of pain" then is used to keep people out of that area and is not used to encourage and foster the most popular means of VHF/UHF communication as evidenced by widespread use.

People are trying not only to provide a future for our hobby but also to encourage a future for our own technological industry. By now you're probably tired of hearing about the state of the high-tech industry in this country and how other countries with a more progressive attitude are passing us to the point where we are an importer of technology. Everything in life is competitive and sort of like a race. Two things to keep in mind about this kind of race, though, are that status quo means everything is passing you by, and you're always staring at the wrong end of what's in front of you.

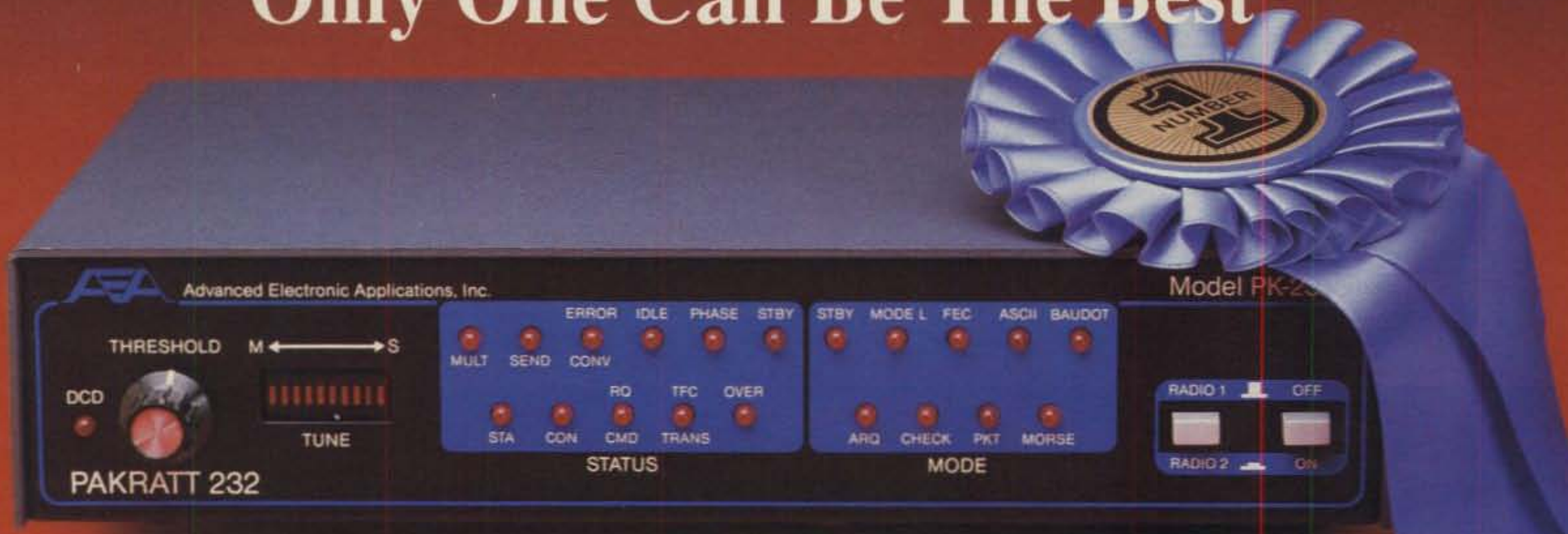
Before you get caught up in imagined loss, think about what everyone, including our country, stands to gain. Try to keep an open mind. Issues are still emerging, and nothing has been written or finalized. On an entry level, enduring something simply because it is an obstacle that "the rest of us went through" does not build character or ensure that one will be a good amateur. I would like to believe that we can exercise our potential for being better than that, and not simply take delight in others being held back from membership in the "I got mine club."

73, Alan, K2EEK

Sav You Saw It In CQ

Others May Try to Imitate, But...

Only One Can Be The Best



Morse Code - Baudot - ASCII - AMTOR - Packet - Facsimile - Navtex

Amateur Net Price $319.95

It's a lesson you learn very early in life. Many can be good, some may be better, but only one can be the best. The PK-232 is the best multi-mode data controller you can buy.

1 Versatility

The PK-232 should be listed in the amateur radio dictionary under the word Versatile. One data controller that can transmit and receive in six digital modes, and can be used with almost every computer or data terminal. You can even monitor Navtex, the new marine weather and navigational system. Don't forget two radio ports for both VHF and HF, and a no compromise VHF/HF/CW internal modem with an eight pole bandpass filter followed by a limiter discriminator with automatic threshold control.

The internal decoding program (SIAM[tm]) feature can even identify different types of signals for you, including some simple types of RTTY encryption. The only software your computer needs is a terminal program.

PC Pakratt Packet TX/RX Display

Facsimile Screen Display

2 Software Support

While you can use most modem or communications programs with the PK-232, AEA has two very special packages available exclusively for the PK-232....PC Pakratt with Fax for IBM PC and compatible computers, and Com Pakratt with Fax for the Commodore 64 and 128.

Each package includes a terminal program with split screen display, QSO buffer, disk storage of received data, and printer operation, and a second program for transmission/reception and screen display of facsimile signals. The IBM programs are on 5-1/4" disk and the Commodore programs are plug-in ROM cartridges.

3 Proven Winner

No matter what computer or terminal you plan to use, the PK-232 is the best choice for a multi-mode data controller. Over 20,000 amateurs around the world have on-air tested the PK-232 for you. They, along with most major U.S. amateur magazines, have reviewed the PK-232 and found it to be a good value and excellent addition to the ham station.

No other multi-mode controller offers the features and performance of the PK-232. Don't be fooled by imitations. Ask your friends, or call the local amateur radio store. We're confident the PK-232 reputation will convince you that it's time to order your very own PK-232.

Call an authorized AEA dealer today. You deserve the best you can buy, you deserve the PK- 232.

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AEA Brings you the Breakthrough!

Announcing

• **Dayton ARA Scholarship Program** - The Dayton Amateur Radio Association is now accepting applications for its 1989 Scholarship Program. The program is open to any licensed amateur graduating from high school in 1989. Awards will be based on a combination of financial need and academic accomplishment with consideration given for service to amateur radio and community involvement. There are no restrictions on the student's course of study. Applicants are not restricted to those preparing to pursue four year baccalaureate degrees. Those working toward associate degrees or planning to attend an accredited technical institution will also be considered. Each winner will receive $1,000.00 toward tuition at the school of choice. All entries must be postmarked no later than May 15, 1989. Award winners will be announced on or about June 1, 1989. For information and application forms, write to: Scholarship Committee, 317 Ernst Avenue, Dayton, OH 45405.

• **1989 Scholarship Program** - The Atlanta Radio Club has announced its 1989 scholarship award program. Up to two $1000 cash awards will be given to qualifying licensed amateurs. Applicants must be high school seniors graduating in 1989 and entering an accredited college or university as freshmen for the first time. Awards will be based on factors such as class of amateur license, citizenship and/or leadership ability, CEEB SAT or ACT point totals, and grade point average. Some consideration of those having financial need will be given, along with preference to people living in Georgia and contiguous states. Mail requests for application blanks to: Phil Latta, W4GTS, 259 Weatherstone Pky., Marietta, GA 30068.

• **Amateur Radio Classes** - Chelsea Civil Defense, in cooperation with QRA Radio Club, will sponsor amateur radio communications classes evenings at Chelsea High School starting March 7 for those interested in obtaining a Novice (basic level) or Technician/General license. The number of registrations received will determine the specific classes to be held. A minimal fee will be charged to cover cost of materials only. For more information, write to Frank Masucci, 136 Grove Street, Chelsea, MA 02150. (Enclose your telephone number.)

• **Fairbanks, Alaska** - In celebration of Ice Festival, a ten-day event celebrating the coming of spring, members of the Arctic ARC and the Borealis ARC will participate in the 5th annual Ice Festival QSO party from March 10–19. Members of both clubs can be found on most amateur bands from 10 to 80 meters, phone and CW. To receive a special QSL card send your QSL card and an SASE to the station contacted. Also special-event stations KL7YQ and KL7KC will operate from February 18 to March 11 in celebration of the sixth running of the Yukon Quest, a 1000-plus mile sled dog race. Suggested frequencies: phone 7.290, 14.240, 21.340, 28.550; CW 7.030, 14.030, 21.030, and 28.005. For a special QSL card send an SASE to P.O. Box 81389, Fairbanks, AK 99708-1389.

• **Piscataway, New Jersey** - The Piscataway ARC will operate their annual special-event station on March 18–19 from 0000–2400Z each day to commemorate the WW II operations of the Voice of America Relay station, WRCA. Members will operate under their own callsign, and sign /VOA. Suggested frequencies: CW, Novice portions of the bands; phone, the lower third of the general portion of the bands on 75, 40, 20, and 15 meters and the Novice portion of the 10 meter band. For certificate send #10 (for unfolded a 9" × 12") SASE with QSL to KO2K *Callbook* address.

• **The following hamfests, etc., are slated for March:**

Mar. 4, **Fox Cities ARC Hamfest '89,** Appleton East High School, Appleton, Wisconsin. Contact Don Baker, NB9J, 621 West 7th St., Kauauna, WI 54130 (414-766-3886).

Mar. 4, **Peel ARC Fleamarket,** North Peel Secondary School, Bramalea, Ontario, Canada. Contact PARC Fleamarket, 20 Hillbank Trail, Bramalea, Ontario L6S 1P6, or call James L. McMurray, VE3BDI, 416-458-0505.

Mar. 4, **State Technical Institute Hamfest,** Delton Middle School, Delton, Michigan. Contact State Technical Institute ARC, Attn: Hamfest, Alber Drive, Plainwell, MI 49080. (VE, CET, and NABOR exams.)

Mar. 4–5, **South Texas Amateur Repeater Society Hamfest,** Civic Center, Harlingen, Texas. Contact Dr. David Woolweaver, K5RAV, 2210 S. 77 Sunshine, Harlingen, TX 78550 (512-425-7744). (VE exams.)

Mar. 5, **Two Rivers ARC Hamfest,** Rostraver Fire Hall, McKeesport, Pennsylvania. Contact Louis H. Zimmerman, N3GPJ, 911 Roland Road, Wilkins Twp., PA 15221 (412-351-1562 from 10 AM to 10 PM).

Mar. 5, **York Springfest (Ham and Computer),** Dover Firehall, York, Pennsylvania. Contact York Springfest, P.O. Box 50, Shrewsbury, PA 17361-0050, or call 301-239-3878.

Mar. 5, **Mt. Tom ARA Fleamarket,** Smith Vocational School, Northampton, Massachusetts. Contact MTARA Fleamarket, 6 Laurel Ter., Westfield, MA 01085, or call Bob, WB1EQS, 413-532-6411 days, or Mickey, N1CDR, 413-562-1027 evenings.

Mar. 5, **Randolph ARA and Parker City 220 Club Hamfest,** Winchester National Guard Armory, Winchester, Indiana. Contact Kedrick Robbins, W9QUH, RR1 Box 389, Parker City, IN 47368 (317-468-6568).

Mar. 10, **Jefferson Barracks ARC Auction,** Concordia Turners Hall, St. Louis, Missouri. Contact Jefferson Barracks ARC, 1624 Union Road, St. Louis, MO 63125.

Mar. 11, **Shore Points ARC Springfest '89,** Atlantic

(continued on p. 94)

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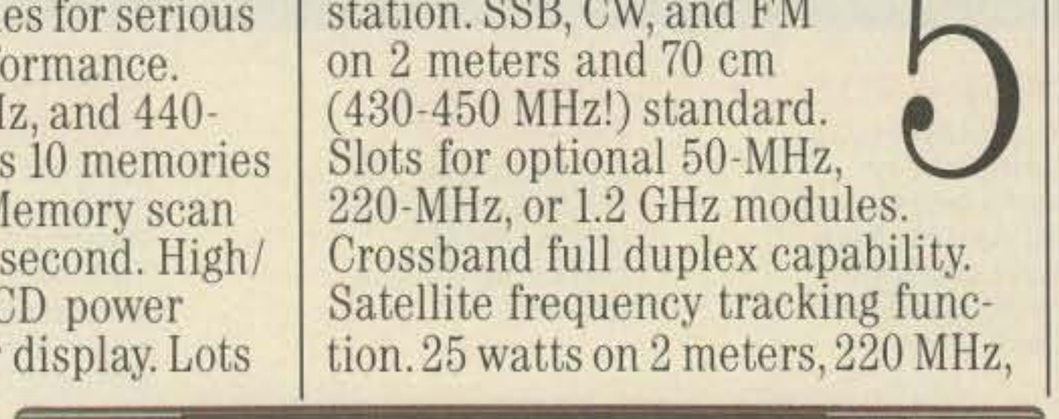

6 **Mobiles that double as answering machines.** Our FT-212R Series mobiles take messages just like an answering machine (with DVS-1 option)! 2-meter and 440-MHz models. 45 watts output (35 on 440-MHz). Auto-dialer DTMF mic with 10 memories (22-digit memory each). 18 memories. Multiple scanning routines. "Do-re-mi" audible command verification. High/low power switch. Oversize amber display. Much more.

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8 **Dual-band mobile with remote control head.** The FT-4700RH mounts almost anywhere—the "brains" on your dash, visor, or door, the "muscle" under your seat. 50 watts output on 2 meters, 40 watts on 70 cm. Full crossband duplex. Simultaneous monitoring of each band. Volume balance control for dual receive operation. 9 memories (each band). Extended receive coverage. Reverse repeater shift. Bright dual-band display. 10 memory autodialer mic (option). More.

9 **HF price/performer.** Don't let the FT-747GX's affordable price fool you. This rig really works the DX! 100 watts RF output on 160 to 10 meters. Continuous receive from 100 kHz to 30 MHz. LSB, USB, CW, and AM. Slot for optional FM unit. 20 memories. Split-frequency operation. CW and AM filters. Plus one-touch noise blanker. All-mode squelch. RIT. 20-dB attenuator. Great receiver with superb overload protection. More.

10 **HF field-day favorite.** Contesters appreciate the portability and performance of Yaesu's FT-757GX Mark II. 100-watt output. 10 memories. Dual VFOs. Slow/fast tuning selection. IF notch filter. Iambic keyer. 600-Hz CW filter. AF speech processor. 500 kHz to 30 MHz receive. 10 to 160 meters transmit, including WARC bands. All-mode coverage. QSK operation. Continuous RTTY operation up to 30 minutes. More.

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12

13 **Serious VHF/UHF Receiver.** Our FRG-9600 is a smart way to monitor. 60 to 905 MHz coverage. USB, LSB, CW, AM, FM wide and narrow. Optional NTSC video module. Scanning steps of 5, 10, 12½, 25 and 100 KHz. 99 memories store frequency and mode. Memory scan (also scans between memories). Keyboard frequency entry. 24 hour clock. Multiplexed output. Fluorescent readout. Signal strength graph. AC power adapter. Much, much more.

14 **World-class HF receiver.** The FRG-8800's perfect for keeping up with the world. Continuous coverage from 150 KHz to 30 MHz. Expanded coverage with optional 118-174 MHz VHF converter. USB, LSB, CW wide/narrow, AM wide/narrow, FM. 12 memories. Also programmable scanning routines. Keyboard frequency entry. LCD display. SINPO signal graph. Computer interface capability. Two 24-hour clocks. Recording functions. Much more.

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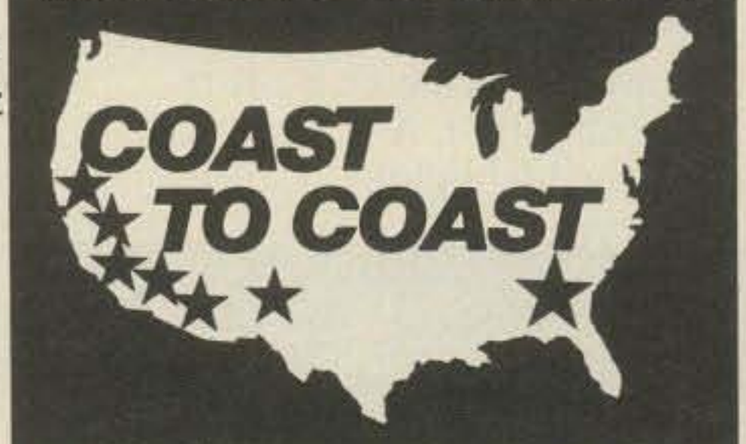

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The top three—VP2ML, P40V, and EA9IE—swapping contest strategy at the Visalia DX convention.

This is Cliff, SV1JG (J45JG), waiting with his son for the boat to bring them back from the Dodecanese.

Results of the 1988 CQ World-Wide WPX SSB Contest

BY STEVE BOLIA*, N8BJQ

What started out with such great promise turned into disappointment several hours into the contest. A major flare early in the weekend turned excellent conditions the first few hours into really bad conditions for all but the last couple of hours of the 32nd *CQ* WPX SSB Contest.

A change of scenery and the unusual conditions helped Carl, P40V, break his three-year streak of second-place finishes. Carl's 10 meter advantage from Aruba was the difference in his battle with 1987 winner EA9IE. In the closest finish in recent years Carl edged out Juan by 300K. Congratulations, Carl and Juan. Third place and tops in North America was Chod, VP2ML, with a new North American record. Fourth place went to HC1OT, with Oceania leader N7NR/NH6 number five. TW5E operated by F6BEE was the top European finisher, with AT0T (Op. K3TW) as the top Asian. Tom has now moved on to Tanzania, so look for him with a new call in 1989.

Two world records came from South America, with ZY5EG (Op. PY5ZBA) easily topping CE6EZ's 1984 10 meter record, and ZZ5EG (Op. PY5EG) bettering ZP5JCY's year-old 20 meter record. Luis, ZP5Y, made a valiant attempt at the 15 meter record but came up a little short. HA9RE edged out TW4O (Op. F6ARC) for the top spot on 7 MHz, with VE2ZP the big gun on 3.5 MHz and CT1AOZ easily taking top-band honors. Congratulations to all.

The gang at KH6XX returned to the top of the multi-multi class with a new Oceania record. Number one in Europe and second overall was the fine crew at UP4A, with WL7Y the leader in North America and JA9YBA the top Asian entry. French Guiana provided the location and special callsign for multi-single champ TX0A. FM5CL was second, and number one in North America, with H22H tops in Asia, LZ9A leading Europe, YE4X the top Oceania entry, and 5H1HK tops in Africa.

In the QRP category 4X6IF was easily the big gun. His 879K easily topped the all-band class, with PY1ACV leading the way on 28 MHz, RW6AC on 21, ZL1AXB on 14 MHz, UB5MMP on 7, and OK1FGC tops on 3.5 MHz. Congratulations for such fine efforts under such adverse conditions.

KQ2M at KM1H again tops the USA leader board followed by NR5M, WX4G, and WM5G. Following the pattern of the rest of the world, all-band scores were down slightly from 1987. The biggest score increases were on 10 and 15 meters. KY5N led all North America on 10 meters, followed by N4EJV, K6SVL, KH6DW/KS6, and K5MK. It took 438K to win compared to KM5K's 13.5K in 1987. WB5VZL was the big news on 15 meters. George's 1.8M points easily led all US 15 meter ops. Second goes to AI4R with 877K, with WA4FBH, WF5E, and N9AG/8 rounding out the top five. The 1987 40 meter champ, KM6B, moved to 20 meters with the same results. Jim edged out AI7B for the top 20 meter spot, with KV0Q taking over as USA 40 meter champ. NO2I captured the first USA 3.7 MHz trophy, and K5UR repeated as top-band champ. In the QRP class WC7Q (Op. K7SS) led the way among the single ops with KB4IOS tops on 28 MHz, N1AFC tops on 21, W6YVK on 14, and KH6CP/WW1 tops on 3.7 MHz. Winner of the new USA Novice/Tech trophy is KA7WPD/T with 31,640 points. Eight entries were received in this category, and it will be continued for 1989. Remember, you must show your licence class on the summary sheet, and this category is only for the continental USA (not KH6 or KL7).

In one of the closest battles WC4E came out the new multi-single champ with 1987 champ KI6P only 200K behind, and N4WW only 500K behind the leader. The new multi-multi champ was KC3EK followed by NB6L.

The contest expedition trophy went to YM2KC. Ops. TA1E, TA1AC, TA2AD, TA1KA, KB6JCX/TA, YU3CB, TA2J, TA2AH, TA1AZ, and TA2BE put on a field-day-type operation and battled adversity to provide a brand new prefix to many. Thanks, guys.

The 1988 contest again found many who made the extra effort to provide a new prefix or DX country. Many thanks to 3A8F (look for him as 3A9F in 1989); 3A/DJ6QT; AT0's T, L, N, and Z; W8KKF/WP2; V31KA; CI8C (on the Ski Trek team); XG1ALH; 9J0A; A25/ZS6P; 9N1MC (his first contest); JT0NP; JY9LC; ZC4DS; I3BQC/IL7; LH2A; SX0GC; J45JG; K4YT/4D; FO5IW; T30MA; FJ0A; TX0A; TD9G; 4C2C; H22H; YM2KC; BY1CKJ; BY4ALC; YE4X; DX1A; LR1V; XR4TA; and AX9LZ are some of the many who provided much-needed multipliers and new DX countries.

The 1989 contest will feature a slight change in the rules concerning the definition of a prefix. Hopefully this will help to clarify some of the misconceptions and also standardize the WPX

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Rear panel controls are provided to adjust the VOX, cw monitor level and tone, and SSB sidetone monitor level. Switching is provided to control conventional linear amplifiers and of course, high speed switching for QSK linears, such as the Titan or the Hercules II. Other rear panel inputs and outputs for transverters, FSK (170 Hz shift), fixed level audio out, audio in, external speaker, aux dc jack and provision for the optional RS-232 control interface. An absolute delight for the all mode operator.

The Paragon is the result of a three year engineering effort. We are proud of the Paragon and we think it has set new standards of excellence in synthesized rigs. Check it out yourself. We think that you will share our pride in the Paragon.

The Classic CORSAIR II...

Unique in all the world, the CORSAIR II is the only ham transceiver available that uses a crystal mixed, permeability tuned oscillator. The ability of this scheme to reject strong adjacent signals and to dig out weak signals under the most adverse conditions is legendary. The 95 dB of dynamic range is all useable!

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The transmitter is well known for outstanding audio quality on SSB and QSK CW performance is simply beyond comparison. All ham bands are covered, 160 through 10 meters with WWV at 10 MHz. The front panel is a thoughtful and spacious arrangement with only the controls that you need.

If your number one priority is outstanding performance on the ham bands, and simplicity is still a virtue, you may be the kind of purist who deserves the classic CORSAIR II.

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Model 2510 B

The Model 2510 B, mode B, satellite station is a 70 cm, 10 watt SSB and CW transmitter with a super-sensitive, low noise, 2 meter to 29 MHz receive converter. The receive conversion idea takes advantage of the excellent selectivity and sensitivity that you already have in your HF station. Frequency tuning is with the PTO in the 2510B and the transmitter automatically tracks the receive frequency for "transceive" operation. "Split" operation is also provided. Two bands are included for full coverage of Oscar 10 and Oscar 13.

The Model 2410 is an all mode, broadband, 100 watt, 70 cm amplifier that adds 10 dB of gain to your up-link signal. Tx/Stby control can be hard-wired or automatic when the drive signal is present. Primary power is 12 to 14 Vdc at 20 amps.

Model 2410

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The heart of the power supply is our own tape wound, four core Hypersil® transformer that weighs in at an impressive 41 lbs. The transformer is conservatively rated at 2.5 kva CCS. (9.5 kva IVS.) The power supply is housed in a separate utility enclosure and is nearly noiseless even at full power.

Front panel features include a ten element LED bargraph that displays peak power, a multi-meter selectable to read plate voltage, forward or reverse power and grid current. A matching meter is dedicated to display plate current. The TUNE and LOAD controls use 3:1 vernier drives which, in combination with a great RF deck design, make the TITAN a real "pussy cat" to operate.

The low drive requirement of the TITAN (65 watts for 1500 watts output, typical) makes life much nicer for your exciter too. This is especially comforting when operating keydown modes such as RTTY. Two product review articles have been published, see QST April 1986, CQ February 1986.

If you are ready to choose your dream amplifier the TITAN has everything but the highest price. Check it out!

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Hercules II No Tune 550 Watt HF Amplifier

The HERCULES II, Model 420, is an amplifier design that offers a combination of unique features that can only be achieved using modern solid state technology. Instant on, 12 - 14 Vdc operation, no-tune broadband final and compact size. General coverage operation from 1.8 to 22 MHz (to 29.999 MHz with authorized modification). Add to that lightning fast QSK cw, remote control, superb linearity and a low drive requirement. Outstanding!

The HERCULES II will interface nicely with virtually all transceivers. The front panel includes an analog multi-meter for collector current, voltage, forward power and SWR. A 10 element LED bar-graph display indicates peak output power. Band selection is made from the front panel switch or remotely controlled through a rear panel connector. Accessories are available for mobile remote control and automatic band tracking when using a Paragon. A front panel speaker is built-in.

The Model 9420 115/220 Vac power supply is in a separate utility enclosure and connects to the RF deck using a 6 foot power cable. It provides 80 amps to the amplifier plus 20 amps at 13.8 Vdc to power a 100 watt output exciter.

Two KW Antenna Tuner

The latest version of the highly regarded Ten-Tec antenna tuner is now the Model 238. The 238 has been re-styled to match our transceivers and looks great in your shack, whether you layout is "look alike" or "mix and match." This tuner adds a great deal of versatility. It will load virtually any unbalanced (coax fed or long wire) antenna. The high power balun is built in as standard which allows the use of balanced feeders also. Full coverage from 1.6 to 30 MHz. The modified "L" network will tame an SWR of at least 10:1, any phase angle, without false load problems. The lighted slide rule dial and calibrated tuning knob skirts make it possible to log settings and quickly QSY to the same frequency and antenna, without going through the tuning process again. Lighted multi-meter reads power in two ranges, plus SWR. A great way to operate all bands, including WARC and MARS, with something less than a world-class antenna farm.

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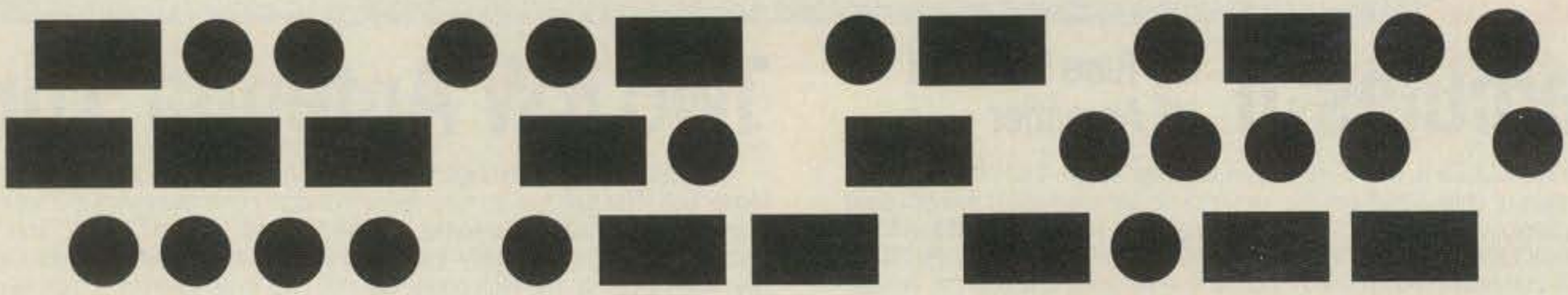

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Forty-five watts on VHF and thirty-five watts on UHF put more power under your dash. And there's nobody else on the road who can match our two-year limited warranty.

The DR 510T gives you cross band/full duplex, 37 standard subaudible tones, encode/decode and an internal duplexer. It also has CAP and MARS modification capability.*

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CIRCLE 68 ON READER SERVICE CARD

TROPHY WINNERS

SINGLE OPERATOR—ALL BAND

WORLD: Stanley Cohen, WD8QDQ Trophy. Won by: **Carl Cook, P4ØV (AI6V).**
U.S.A.: Atilano de Oms, PY5EG Trophy. Won by: **George De Montrond, NR5M.**
AFRICA: CQ Magazine Trophy. Won by: **Juan Jose Rosales, EA9IE.**
CANADA: Ed Sleight, K4SB Trophy. Won by: **John Sluymer, VE6OU/3.**
CARIB/C.A.: Arturo Gigante, Jr., HI8GB Trophy. Won by: **Chod Harris, VP2ML.**
EUROPE: Bernie Welch, W8IMZ Trophy. Won by: **Jacques Saget, TW5E (F6BEE).**
JAPAN: The DX Family Foundation Trophy. Won by: **Fumishige Takeyama, JE4VVM.**
OCEANIA: CQ Magazine Trophy. Won by: **Dave Heumann, N7NR/NH6.**
SOUTH AMERICA: Ron Moorefield, W8ILC Trophy. Won by: **Pedro Katz, HC1OT.**
WORLD QRP/p: Dayton Amateur Radio Assn. Trophy. Won by: **Danny Rosenbaum, 4X6IF.**

SINGLE OPERATOR—SINGLE BAND

WORLD: John N. Reichert, N4RV Trophy. Won by: **Luis N. Kemper, ZP5Y—21 MHz.**
WORLD 28 MHz: Jim Hoffman, PY5ZBA Trophy. Won by: **Atilano de Oms, ZY5EG.**
***WORLD 21 MHz:** Lee Wical, KH6BZF Trophy. Won by: **Peter Zoch Sprengel, ZY5CC.**
WORLD 7 MHz: William Diggins, WA8LXJ Trophy. Won by: **Elemer A. Bielek, HA9RE.**
U.S.A. Novice/Tech 28 MHz: Jon Engelhardt, KAØZFX Trophy. Won by: **Bob Cassoday, Jr., KA7WPD/T.**
U.S.A. 14 MHz: Doug Zwiebel, KR2Q Trophy. Won by: **Jim Stevenson, KM6B.**
U.S.A. 7 MHz: William Diggins, WA8LXJ Trophy. Won by: **William D. Johnson, KVØQ.**
U.S.A. 3.7 MHz: Lance Johnson Engineering Trophy. Won by: **Bob Ruymen, NO2I.**
JAPAN: Ken Ruddock, K6HNZ Trophy. Won by: **Kouhei Kawagoe, JR6GKT—21 MHz.**
***JAPAN 28 MHz:** Joe Arcure, W3HNK and Toshi Kusano, JA1ELY (Terry Appleton, W4GSM Memorial Trophy). Won by: **Hideo Saji, JH1LBR.**
EUROPE: Myron Crofoot, WB4VQO Trophy. Won by: **Station 4N4A operated by YU4EU—21 MHz.**
CANADA: CQ Magazine Trophy. Won by: **Brian Kelly, VO1QU—14 MHz.**

MULTI OPERATOR—SINGLE TRANSMITTER

WORLD: Mike Badolato, W5MYA Trophy. Won by: **Station TXØA operated by: FM5CD, F6BPX, F6GWV, FD1MAY, F6HMQ.**

MULTI-OPERATOR MULTI-TRANSMITTER

WORLD: Henry Thel, VE7WJ Trophy. Won by: **Station KH6XX operated by KH6XX, KH6ND, WH6BGI, N5CT/KH6, 4X6AI/KH6, KH6BZF, Lulu.**
U.S.A.: CQ Magazine Trophy. Won by: **Station KC3EK operated by KC3EK, NW5E, K1DQV, KN3P, W3HXI, K3ZZ, WB2EKK, WA3EKL.**

CONTEST EXPEDITION

WORLD: Kansas City DX Club Trophy. Won by: **Station YM2KC operated by TA1E, TA1AC, TA2AO, TA1KA, KB6JCX/TA, YU3CB, TA2J, TA2AH, TA1AZ, TA2BE.**

**Donor responsible for trophy.*

award and the contest definition. Briefly, a prefix is now considered the letter/number combination which makes up the first part of the callsign. ZS66 and ZS6 are separate prefixes, as are W2ØØ and W2, etc. Calls without numbers will be treated as they have been. Also, note that there are changes in the mill regarding portable operation in the USA by reciprocal licensees. Please make certain that you sign portable correctly to avoid possible disqualification and/or action from the FCC.

There was one taker on the offer to send in your log on disk. VP2ML provided a copy of his log on disk, which I was able to directly enter into my log-checking program. Thanks, Chod. Anyone wishing to do so may send me an ASCII file, containing as a minimum the call and band in separate fields. If you would like to send a complete log on disk, include the serial number and RST also, and send the log in chronological order, not sorted. Don't forget to send along the summary sheet. I can only read MS-DOS 5¼ inch 360K or 3½ inch 760K disks. No high-density disks, please.

There are still a few who for some reason or another choose not to dupe their log. If you noticed a rather large score reduction, that may be the reason for it. Too many unmarked dupes can and will lead to disqualification.

I recently received a proposal to add a new category to the single operator class. The proposal would add a "high band only" class which would include 10, 15, and 20 meters. This would enable those with a less than optimum low-band setup to compete in a separate category. Before we change any rules, I would be interested in hearing comments on this. I can be reached via *CQ* or at my *Callbook* address (1988 and later).

That about wraps it up for this one. Thanks go to Scott, N9AG, for his invaluable help with the log checking, and to W8IMZ for his advice and assistance with logs, questions, and the like. Without their help it would be extremely difficult to get the results out on time. Also thanks to the folks at *CQ* for getting "computerized," which makes my job a little easier. Rather than sending in reams of paper and having everything retyped, it is now sent on disk and fed directly to the typesetter. Unfortunately, I can no longer blame the typos on them (hi).

The 1989 contest will be March 25th and 26th. Forms and current rules are available from *CQ* for an SASE (rules for the 1989 contest can also be found in the February issue of *CQ*). To speed up things write "WPX forms" on the outside of the envelope. Hope to see you all during the contest.

73, Steve, N8BJQ

Part of the gang at N3BB/5. Front to back are N5TR, WN4KKN, and N3BB.

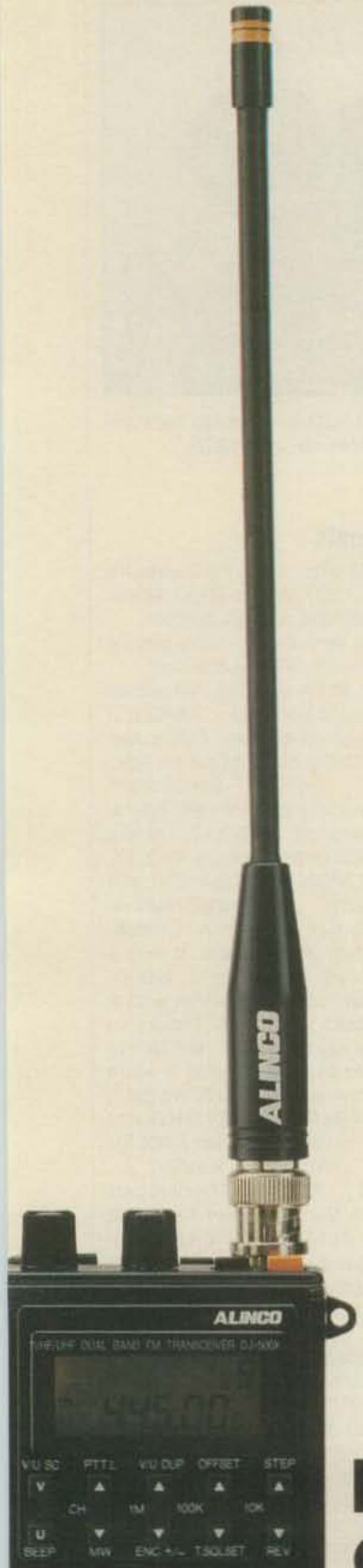
Random Comments

Congrats to all 66 stns . . . cpy my 2 watts fm car on beach . . . *CX8DT*. Where about Americans! Better conditions 2 days before . . . *EA4CFN*. Beautiful sensation to have pile up and compliments with QRP operation! . . . *IK6ATS*. Thanks to all the stations that helped my QRP/p signal sound like QRO . . . *IK8CHL*. I got big thrill in two times as many QSOs than last year through QRPp but I regret no QSO with the stateside . . . *JH9HXF/1*. Bands much better than last several years for QRP operation . . . *KB7M*. Heard lots of DX on 75 meters . . . *KH6CP/WW1*. Worked my first DX, VK2, TX, 5B4, and YW . . . *PA2PDN*. Working VK2KL and VK2ADE with 3 watts . . . *VE3NVP*. Auroral opening to Europe Sat. noon to N. Europe. Worked every station on the band. It was a west coast QRP dream come true . . . *W6CN*. Did better this year than last. QRP/p with a lousy antenna makes it difficult. Thanks to those who dug my signal out . . . *WA7NWL*. Some found it hard to believe what 5 watts sounds like on 10 meters. Wait until we get a good opening! . . . *WB6JMS*. Thanks to K7RI for station, WC7Q for callsign, and rainy WX for keeping me going . . . *WC7Q (Op. K7SS)*.

Tnx nice contest . . . *YO3BDP*. The best part was the pileup on Sunday when the band opened to USA . . . *ZL1AXB*. Enjoyed the contest and hope to hear everybody next year under better conditions . . . *ZS6PT*. You wouldn't believe how difficult it is to get a good signal out of Monaco! . . . *3A/DJ6QT*. A new prefix 3A8F very appreciated by all the WPX chasers sure! See you later, boys, in 1989 as 3A9F (a new one) . . . *3A8F*. TVI when beaming NE (JA), so had to listen that direction only . . . *4N4L*. This is my first experience in contest . . . *9N1MC*. What irony! Working TU4BR/5U7 when I need both countries for DXCC! . . . *AB2E*. Had to go on ski trip before 30 hrs . . . *AB4ES*. Tornados and prime time to Europe and Asia don't mix . . . *AI2C/4*. Where were the VKs and ZLs? . . . *AI4R*. Disappointing result. Band died after four days of great propagation B4 the contest . . . *AI7B*. Bad propagation. QRM from zone 16 was unbelievable . . . *ATØZ*. Congratulations, Atilano, ZY5EG . . . *CE3DNP*. Spent the last 14 years contesting on 10 and 15, but enjoyed my comeback to 20 . . . *CE6EZ*. Condx good on Saturday but nil on Sunday. No openings to Europe . . . *CN8FC*.

Wanted: Propagation for second day! Reward: A QSO with CQ5BOP . . . *CQ5BOP*. Difficulty experienced in getting through to Europe

COMING SOON.



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Alinco's new DJ-500T hand held dual bander really puts out.

Like 6.5 watts with the optional 12 volt battery. Or our standard 3.5 watts VHF and 3 watts UHF with a local power setting of .5 watts. No other HT delivers such power.

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CIRCLE 70 ON READER SERVICE CARD

The number one multi-single in Oceania was YE4X. Here YB0DPO is operating, with YB0TK standing, YB0EMJ in the center, and YB0SY on the right.

and U.S. due to heavy QRM . . . *DU1NH*. Voltage was 190 volts so max power output was only 300-400 watts, hi! Anyway I enjoyed contest . . . *EA2BUN*. Dawn conditions for USA the Sunday . . . *EA3EGB*. What a nice surprise to be called by AX9 (Lord Howe) and VS6 (Hong Kong). Tks . . . *EA9IE*. Used ED3 as special prefix for this contest . . . *ED3AAY*. Two new countries worked . . . *EI7DJ*. On 160 I was watching for any GI station, and I have got 3A2 . . . *F3NG*. So happy to work P40V, I forgot to write my serial number. He was hard to meet! . . . *F6DLM*. The GB2 PX probably worth 10/15% more QSOs. Shame about aurora after super condx before contest . . . *GB2FXB*. Excellent contest again. Sorry I couldn't operate longer but work had to come first this year . . . *GB5AR*. First DXpedition. QTH was Colonsay Is. Inner Hebrides—IOTA Ref EU-08. QSL via G4OBK . . . *GB5CO*. Conditions not too good. Spent a lot of time calling CQ and listening . . . *GW0DJX*. Don't know what was in worse shape, me or the band. Felt lousy all weekend, having to take long breaks with no contacts . . . *GW4BLE*.

Never called CQ. Just answered them for new PXs. Nice test . . . *HI8LC*. It's my first WPX Contest. I'm radio amateur after one year. Without amplifier it's very difficult to work . . . *HJ3NTI*. I enjoy a lot the 1988 *CQ* WPX . . . *HK1LDG*. This is my first experience in WPX Contest and I am really happy for it . . . *HK6IKV*. Ten meters opening up again, but when YJ8NJS called just to give me a contact . . . *HL9FN*. It is not easy to have contacts without a linear amplifier. but a contest is always a good experience . . . *I6YEF*. The greatest thrill was the functionment of the 14 MHz dipole on 5 band! (without ant. tuner) . . . *IK4GNK*. Not good propagation of North America (Canada and USA) Sunday afternoon! . . . *IN3XUG*. How about to repair your linear few hours before the contest . . . *J45JG*. The big wall standing on the Pacific second day. Quite silence. Can't hear Ws' sigs . . . *JA3BBG*. I joined this contest for first time. I tried to work about 200-300 stations, but I connected above 500 stations . . . *JA7JPK*. 3A8F is my first 3A station. WB5VZL, his signal is the biggest of USA. I was very surprised . . . *JA7QFU*. VY FB DX test. Next contest I hope get 100,000 points . . . *JE3DYW*. I was too sleepy to operate at that night . . . *JE3ZFS*.. I enjoyed this WPX SSB contest . . . *JE6GIQ*.

I am high school student in 12th grade. WPX is my first contact. Please remember me . . . *JF4UBH*. I like contest, especially WPX! . . . *JF7WLX*. I'm very surprised to can much QSO of use this system. BANZAI WPX Contest! . . . *JG1UZD*. Tnx FB thrill 88! . . . *JG4TFC*. There were big pileup when 5V7 was QRV on 10 meter band. I worked him. It's exciting QSO . . . *JH1BXH/0*. I had very heavy snow-noise on first day. Without the noise I could have caught 200 more QSOs . . . *JH5GHM/1*. I'm chagrined at no propagation to U.S.A. through the contest . . . *JJ1TBB*. I enjoyed the contest instead of diving in Guam. Thanks for calling. CU again from KH2 . . . *JL1BLW/KH2*. W7WA—he is best contest operator of all U.S. . . . *JM1SOX*. Oh! Lots of Japan stations! It was wonderful! . . . *JT0NP*. When do we get good conditions for both days? . . . *K1KJT*. Much better condx than last year. Come on sunspots . . . *K2OLG*. Oh yes—starting to remember 21 MHz exists . . . *K3IPK*. Touch of aurora during contest but condx good at times. JT0NP 59 + + on 15 . . . *K3ZO*. Antenna capabilities very limited due to wind/ice damage. Operated only bands for which antennas were operable . . . *K4OD*. Viva la sunspot cycle! . . . *K5MK*. Where was Europe second evening? . . . *K5RR*. Fun to operate from Texas again—even if only for an hour . . . *K5ZD*. Hated to miss my favorite contest. Worked a few hours in PA and a few hours in TX . . . *K5ZD/3*. Biggest thrill—working CR3EU on 40 meters . . . *K6ICS*. No JA opening—worked some on backscatter . . . *K6SVL*.

New Paragon good radio. No phase noise, hi . . . *K8CV*. Found CY1 calling CQ on Sun. with no takers . . . *K8GSR*. Not many new DX prefixes but stateside calls are a WPXer's bonanza . . . *K8KUH*. Would get the flu and spend most of my time in other room! . . . *KA6ING*. Had fun and was able to contact a few new countries . . . *KA7WPD/T*. Biggest thrill—working KL7RA near Fairbanks on 10 meters using a 5 foot whip antenna stuck out my apt. window . . . *KB2DUH*. Maybe new antenna hears better, but seemed to be much more activity . . . *KB2SE*. Wish I'd had more time on 10 meters. Conditions great . . . *KC4BIO*. Having TT8AK answer my CQ on 10 meters . . . *KC7V*. Biggest thrill—working YB0DPZ on my lousy antenna on 80 . . . *KC9C/0*. I just want to thank all those who gave me a QSO . . . *KC9EW*. A true exercise of logging and duping . . . *KD2RD*. Murphy struck too many times. Lost 2 amps. What happened to the JAs? . . . *KE2BA*. Always a good contest regardless of which end I'm on . . . *KE7EQ*. For the first time I worked JA1, KH6, and T47DX . . . *KE8NH*. Worked 8 YBs and a JT in half-hour period. Rest of time conditions were horrible . . . *KF2O*. QRM + duplex + limited frequency authorization = first and last contest on 40 SSB . . . *KH2F*. My apology to all that I was not a new country. In your next note to FCC let them know how bad the present call system is . . . *KH6DW/KS6*. First contest. Damm! I'm bit! CU in the fall . . . *KJ6AW*.

A contester's dream? Your own lagoon on a Pacific island. Here's FO5IW on the edge of his lagoon.

Only wish 15 had been better on Sunday . . . *KK4RV*. A high latitude disturbance hit us at 1300Z the first night ending any hopes of a good score . . . *KL7AF*. Sun. morning conditions really defined the terms watery and thin . . . *KM6B*. Didn't find the bands as open this year as last, but it was fun . . . *KP4CZ*. Considering the propagation, I'd say the biggest thrill I got was from the sausage omlet my XYL made me for Sunday breakfast . . . *KS2M*. I like the contest better during the sunspot minimums. Less competition. After all, everyone knows the bands are dead then . . . *KT2D*. Recuperating from surgery plus European no-shows equals low score! . . . *KU1X*. Well, a WA2 did call on lower sideband. QSB was terrible to Europe Saturday . . . *KY5N*. A lot of rare DX I didn't know. Surprised to hear Hawaii and Guatemala so late . . . *LA1EE*. First WPX contest. Will be back next year . . . *N0/HJQ/T*. Ten meters stayed open for DX until 9:30 PM local time! . . . *N2AZS*. Good openings to Northern Europe so late in the day . . . *N4EJV*. Europe on 40 meters and Hawaii on 80 meters! . . . *N5IET*. Stateside stations operating with self-assigned prefixes appended to their calls is decadent to the whole WPX program! . . . *N6JM*. This was my first experience with WPX. See you again next year . . . *N6LL*.

The European pileups were the hardest to unscramble. Signals were 40 dB over S-9 and about 100 stations deep! . . . *N7DF/WH2*. Getting such good signal reports running barefoot from countries so far away . . . *N7JZW*. Good conditions the first night got me hooked for the poor propagation for the rest of the contest. Good African activity . . . *N9AG/8*. Not a big gun, just a water pistol . . . *N9GFG*. It was a lot of fun. This was my first prefix contest. I hope it's correct . . . *N9HCA*. Conditions were funny. I would hear stations S9 to 30 dB over and could not work them . . . *NC7O*. Worked many never before heard prefixes but thrilled to work TU4BR/5U7 for a new one! . . . *NE6I*. Last contest as a single man. Got married following weekend . . . *NI8L/1*. My apologies to all those I croaked at. I had bronchitis and could hardly talk . . . *NI9C*. First full-time single op effort. Happy with results considering only wire antenna . . . *NJ1V*. First try at single band. Toughest thing was to keep my hands off the bandswitch! . . . *NK3U*. NQ1K license came in 3 hours before start of contest . . . *NQ1K*. Enjoyed the contest. Heard some real exotic calls! . . . *NS8O*. Working VKs and ZLs on 28 MHz at the end of the test was a great way to wrap it all up . . . *NX9T*. Glad the JAs finally showed up on 15 . . . *NY7T*.

Worst propagation in years on Sunday . . . *OH1AF*. Antenna experiment with four helium baloons . . . *OH2BYS*. WPX was a couple of days late this year. In the beginning of the week bands were wide open . . . *OH6EI*. This was my first phone contest . . . *OH9NUE*. What about category YL? . . . *OK2BBI*. Had big trouble with the power supply. With my wife, too . . . *OK3LZ*. After the geomagnetic storm no open USA, sorry . . . *OK3YX*. Had to spend most of day Sunday waiting for band to open . . . *P40V*. Cond. bad, and many QRN from rain

No-17-18

WORLD TOP SCORES

SINGLE OPERATOR ALL BAND

P40V	**12,324,780**	**VE6OU/3**	**4,106,793**
EA9IE	**12,024,365**	KM1H	4,078,912
VP2ML	**7,589,153**	YB0DPZ	3,920,336
HC1OT	**7,237,269**	**TW5E**	**3,548,160**
N7NR/NH6	**5,818,692**	AT0T	3,515,148
HK1LDG	5,494,320	JL1BLW/KH2	3,451,990
TU4BR/5U7	4,957,675	GB2FXB	3,374,100
9J0A	4,372,136	JT0NP	3,341,803
K4YT/4D	4,311,770	**NR5M**	**3,332,700**
VK2KL	4,300,160	OK1RI	3,120,480

28 MHz

ZY5EG	**7,372,512**	**ZP5Y**	**8,939,514**
CE3DNP	3,642,980	**ZY5CC**	**8,120,202**
CX2AAL	3,339,618	NP4CC	3,770,688
LU1LDS	2,670,437	ED8ACH	3,220,158
ZY4OY	1,920,310	**4N4A**	**2,716,816**
4X3M	1,559,691	4Z5UX	2,586,551
YC0EAQ	1,491,815	VO1MP	2,564,617
YY1C	1,341,756	YT3AA	2,352,504
EA8VV	1,158,578	CQ5BOP	2,185,529
A25/ZS6P	1,154,941	WB5VZL	1,886,276
		VE3BVD	1,579,725

14 MHz

ZZ5EG	8,219,627	**HA9RE**	**1,078,640**
YW1A	5,542,754	TW4O	964,168
CE6EZ	4,908,060	UA9CSS	865,940
CE4FXY	4,397,531	DL8PC	783,048
YW5A	3,856,071	KH2F	751,688
VO1QU	**3,276,840**	4N4L	732,828
N7DF/WH2	3,156,090	YT7A	728,850
CT3DL	2,869,536	UA6LQ	704,512
UA9MA	2,336,652	HI3HCE	667,980
NY6M/KH2	2,065,766	**KV0Q**	**644,744**

3.5 MHz

VE2ZP	1,008,844	CT1AOZ	82,592
IO5MXX	891,330	OK3CWQ	49,476
DF8XC	618,444	VE3PN	34,596
AH6AZ	492,030	K5UR	28,248
UO5OQ	485,568	W3BGN	22,468
4N1A	475,376	RB5UI	19,460
HA1XR	471,540	AA4MM	12,636
HA6PX	371,734	F6BVB	9,360
FV8NDX	264,966	YO6AJI	8,466
UB5IKB	254,232	UA4CCC	7,900

1.8 MHz

QRP/p

4X6IF	**A**	**879,860**	RB5GD	21	140,658
RA0JJ	A	426,153	ZL1AXB	14	230,160
WC7Q	A	414,462	JA2JSF	14	67,626
YU2TV	A	312,244	UB5MMP	7	43,460
PY1ACV	28	75,740	IK8CHL	7	10,980
JH9HXF/1	28	53,850	OK1FGC	3.7	52,882
RW6AC	21	200,196	OK1JJF	3.7	52,008

MULTI-OPERATOR SINGLE TRANSMITTER

TX0A	**16,530,415**	FJ0A	7,056,480
FM5CL	10,971,504	HG7B	6,900,080
H22H	10,913,771	TW6A	6,670,165
LZ9A	8,708,610	HG5A	6,659,634
LR1V	8,500,972	HG6N	6,061,576
HD2A	8,170,932	WC4E	5,987,583
YE4X	7,910,724	XR4TA	5,940,000
RL8PYL	7,859,329	KI6P	5,751,599
5H1HK	7,369,926	N4WW	5,416,800
UL8LYA	7,138,579	UZ9CWW	5,348,520

MULTI-OPERATOR MULTI-TRANSMITTER

KH6XX	**24,959,649**	**KC3EK**	**4,134,920**
UP4A	13,710,895	JA9YBA	3,980,106
YT2R	12,887,600	ED4UPM	2,507,313
LZ1KDP	9,694,608	NB6L	2,414,448
WL7Y	9,513,010	JA1YFG	2,032,990
Y34K	8,050,845	PI4DEC	1,094,662
IO3KVW	7,663,042	5K7U	781,560
KL7RA	6,907,868	JA1YCV	91,905
AX9LZ	5,373,075		

U.S.A. TOP SCORES

SINGLE OPERATOR ALL BAND

KM1H	4,078,912	AI2C/4	864,224
NR5M	**3,332,700**	KB0G	811,305
WX4G	2,938,848	KI3L/5	805,374
WM5G	2,256,632	NJ1F	802,196
K6HNZ	2,093,253	KF2O	619,556
K3ZO	1,746,506	KV0I	617,684
KY2J	1,381,097	N8BJQ	613,785
KE7EQ	1,306,588	W9NSZ	553,113
WB2Q	1,081,062	K6EID	468,832
KI6CG	883,482	NT5V	461,560

28 MHz

KY5N	438,140	WB5VZL	1,886,276
N4EJV	395,948	AI4R	877,728
K6SVL	283,716	WA4FBH	760,665
KH6DW/KS6	181,905	WF5E	754,380
K5MK	112,677	N9AG/8	514,960
K2OLG	68,853	KF4HK	389,487
KC5CP	68,796	K3IPK	387,828
WJ7S	62,075	WJ7R	377,559
WA7KLK	35,192	W7FP	336,396
W7AYY	32,630	K1TR	301,550

21 MHz

14 MHz

KM6B	**1,319,830**	**KV0Q**	**644,744**
AI7B	1,065,207	K5RR	277,200
KQ9L	773,685	KD2RD	252,192
WX6M	669,475	AG9S	85,626
K1KJT	626,164	W0RXL	15,688
WF7B/4	521,807		
W1BWS	388,648		
W5FO	203,565		
W4CYC	159,960		
N9HCA	74,100		

7 MHz

3.7 MHz

NO2I	**67,784**	K5UR	28,248
N6CL/5	21,576	W3BGN	22,468
WB5YLT	20,640	AA4MM	12,636
WB8ZRL/0	20,492	WC7S	2,268
		W9RXJ/0	1,764
		N6LL	990

1.8 MHz

NOVICE/TECH 28 MHz

KA7WPD/T	**31,640**	WB5YIW/T	5,814
N0HJQ/T	27,057	N9GMM/T	2,646
WB3CDX/N	23,640	N0IDH/T	399
WB0ZKG/T	18,795	KA8ZHC/T	35

QRP/p

WC7Q	A	414,462	KB4IOS	28	988
WB6JMS	A	68,052	N1AFC	21	66,588
KB3TS	A	54,528	W6YVK	14	589
KB7M	A	35,800	KH6CP/WW1	3.7	520

MULTI-OPERATOR SINGLE TRANSMITTER

WC4E	5,987,583	KI1G	2,941,367
KI6P	5,751,599	WC6H	2,288,338
N4WW	5,416,800	NE8T	2,247,553
KA5W	4,142,190	N7TT	1,577,600
N3BB/5	3,419,577	NZ5I	1,246,225

MULTI-OPERATOR MULTI-TRANSMITTER

KC3EK	**4,134,920**	NB6L	2,414,448

Say You Saw It In CQ

static in the night . . . *PA0IJM*. Bad conditions, but a good opening to Japan on Sunday 1600 over the North Pole! . . . *PA0ZH*. Stations having more than 2000 QSOs and I was a new multiplier for them. Wonderful! . . . *PA2REH*. First SSB contest I ever worked on HF. Will be back next year for sure. Biggest problem: my neighbor's TV set (hi) . . . *PA3DMH*. Not too bad a score for an old man of 74 . . . *PP2ZDD*. Tnx fr FB contest. Have many new prefixes . . . *RZ3DZ*. Fantastic big signal from K4YT/4D . . . *SM0JOQ*. First real contest. Hope I did well even though I got the flu . . . *SM4RRF*. Too many people thought I was in Sweden! . . . *SX0GC*. Very exhilarating, very tiring—what fun! . . . *TU4BR/5U7*.

Thank you for holding of the competitions *CQ* WW WPX Contest. In the competition I made friends and new countries . . . *UA0SNT*. Conditions poor here, especially for USA. Lost many exciting prefixes . . . *UR2RE*. The *CQ* Contests are always holydays for me since 1974. My two month old daughter helped me operate this one . . . *UT4UZ*. By accident, I skipped over 100 QSO numbers. It did wonders for my morale . . . *VE2ZP*. A very busy contest. Managed to pick up a bunch of new prefixes for WPX. Just need the QSLs . . . *VE3NBE*. Excellent contest. Great openings to the South Pacific . . . *VE3VET*. First time I entered this contest. Lots of fun but high local noise wiped me out on second day . . . *VE6BS*. Low solar flux last year and a flare this year. I can hardly wait to see next year's surprise . . . *VE7EIK*. First ever single band WPX effort. Wonder what kind of score with 2 days of good propagation? Maybe next year . . . *VO1MP*. Sixth rest period was a power outage. A pole caught fire half mile up the road. Was I driving it that hard? . . . *VO1QU*. Had 5 new countries call me . . . *VP2ML*. It was very frustrating to hear so many good European signals on 40 that couldn't hear us . . . *W0RXL*. Time limited. Only able to put in a couple of hours. Have developed a hearing problem. Have difficulty on SSB (OK on CW) . . . *W1WY*. Saturday night static 40 dB over S9 along with first spring thunderstorm. Rough copy . . . *W3BGN*. Another great bit of fun. I find that I am slowing down some each year . . . *W4WJJ*. Bands fell apart on Sunday! . . . *W4WKQ*. Worked P40 for a new country on phone . . . *W4YN*. Nice to works quite a few African stns . . . *W7FP*.

Bands poor on Saturday and little better on Sunday. Good contest—73 . . . *W7QN*. Worked T30MA and T30BC a few minutes apart, and T30BC did not know that T30MA was on the island . . . *W9NSZ*. First time in contest. Had fun. Sometimes rather tiring. Lots more paperwork than I anticipated . . . *WA0WAU/4*. I think I need to attend assertiveness school . . . *WA1FCN*. Ten meters was HOT! . . . *WA2HMM*. Fighting pileup to get the 5U for a new country . . . *WA5JDU*. Hopefully last year for hand scoring. Thanks to all for prefixes . . . *WA8YTM*. I sure wanted to work FJ0A. The pileups were fierce! . . . *WB0GFV*. Being ZK1XG's first QSO and then later working YJ8NJS . . . *WB0ZKG/T*. Hopefully the bands will not die on Sunday next time. Wish more Americans would operate on 80 and 40 for multipliers . . . *WB3BRF*. Hope to get code speed up so I can make a few contacts during CW contest . . . *WB3CDX/N*. Should be enough points to finish last anyway . . . *WB5YIW/T*. First time working WPX as a stateside stn.—Wow! What a difference. Lots of alligators out there—all mouth and no ears . . . *WB6BRW/4*. Never again trust C-64 for logging. Much time lost due to it . . . *WF7B/4*. The

Danny, 4X6IF, taking over for Dad as the QRP champ.

storm on Friday killed me on Saturday. Worked 330 stns. (mostly JAs) in first 3.5 hrs., but only 1 JA on Saturday . . . *WJ7R*. I wished for a JA opening . . . *WJ7S*.

If I had only known what a disaster Sunday was going to be, I would have operated all day Saturday . . . *WX4G*. After very bad condx. I was lucky to work four new prefixes in last 10 minutes . . . *WX6M*. Forget propagation forecast. During this contest they were just there—all over—all the time . . . *YB0DPZ*. Thanks for an exciting contest, but disappointed met only few North Americans . . . *YC0EAQ*. Non-active SSB but I will vy active on CW . . . *YC3HCM*. Many new prefixes, thanks to *CQ* . . . *YC7DF*. I thanks very much to all hams and to organisators . . . *YO4BQV*. Not too good conditions . . . *YO6DDF*. Big expectations—poor propagations . . . *YT3AA*. I am very sorry for bad propagations for North American stations, but very good openings for Japanese and South America . . . *YU7BW*. The best world contest. Is my participation no. 5 . . . *YV7QP*. Conditions were fair. Also I think that W9NTU was sleepy, because he called me four times and he have only 52 QSOs . . . *YW5A*. Worked UA1OT for zone 40 and best score yet in WPX . . . *ZL1IM*. Good openings and very hard competitors, CE3DNP and LS1E . . . *ZY5EG*. In the night between 26th and 27th of March the work was impossible because of stormy wind . . . *4N4D*. The only station in Zanzibar . . . *5H1HK*. We had a very big electrical storm during the 48 hours of contest. Noise was S9 + 15 dB . . . *AY6D*.

The CRSA wished to participate in *CQ* magazines WPX SSB Contest. They issued special call BT4YL just for this contest . . . *BT4YL*. We had trouble with QRC (QRM in loudspeakers of a nearby church). The prayers understood patiently our CQ contest calls . . . *ED1DX*. We operated from 400-year-old English farmhouse. Tnx to G4LJF and his family for hospitality . . . *GB4CDX*. First time entering this contest. No power for 7.5 hrs Sunday. Will have generator ready next year . . . *GB5HC*. We were pleased with our final score considering that our linear packed up at the start of the contest . . . *GB8AU*. We experienced all four seasons, plus a new one! . . . *GB8PX*. A good contest. For the first time we have broke no antenna . . . *IK4IEE*. Short opening to Scandinavia on 10 Sunday afternoon was a pleasant surprise . . . *KA5W*. We worked a lot of exotic DX but really strange band conditions kept rates down . . . *KI1G*.

We operated from the Dauberville DX Association's EOC at the American Red Cross. We all had fun . . . *KQ3V*. Seeing 20 meters open to Europe most of first night. Things are getting better . . . *N4WW*. Best addition to the contest station was a pool table . . . *NE8T*. Conditions went down hill fast Sunday. TA1T called us. Always alot of fun . . . *NV4G*. Lack of points on 20 killed us this year. The new prefix attracted too much stateside attention . . . *NW0F*. Our antennas stood on the ice on the lake . . . *OH3AC/4*. Aurora again caused a lot of problems here in northern areas . . . *OH7AB*. All QSLs for TD9G via TG9RZ . . . *TD9G*. Some folks didn't believe our callsign! . . . *VE5QST*. Aurora at this QTH killed us on Saturday night . . . *VE6SF*. Ok, it was our first contest . . . *XE1JME*. Where were all the JAs? . . . *XO5FX*. XR4 is a Chilean special prefix first time issued specially for 1988 WPX contest . . . *XR4TA*. We started by calling CQ on 20 mtrs. That was a big mistake. See you next year . . . *YE4X*. We had some problems due to power cut-off for about 7 hrs. and been forced to operate FT707 with car battery back-up . . . *YM2KC*. We have brought out the special callsign to commemorate our 40th anniversary of the Universidad Industrial de Santander . . . *5K7U*. Ten meters is magic band! . . . *AX9LZ*. Forty meters never opened for us . . . *KL7RA*. Only one amp failed so it was a very successful contest! . . . *NB6L*. No fun! . . . *UP4A*.

Station Operators Multi-Operator Single Transmitter

4Z4YU: 4Z4TI, 4X6GS, 4Z4VG, 4X4OQ, 4Z4NUT, 4X6NFJ, LU6ESH/4X, 4X1646. **H22H**: 5B4MF, 5B4LP, 5B4SA. **5H1HK**: JE3MAS & WH6X. **BT4YL**: JR3MVF, WA6UVF, N6BAE, JA3UB, JM1BDB, JA4HCK, Mom Chen & Mr. Xuru (ops of BY4AA). **BY4ALC**: Chen, Xiao, Irris, Start, Ma, Yang. **BY1CKJ**: KU6T, Zhang Chong Lua, Li Guo Zhen, Wang Guo Xing, Gong ke lu. **XR4TA**: CE4BOO, CE4ETZ, CE4EVR, CE4JZO, CE4MLN, CE4MWK, CE4FYE, CE4AET, CE4JZQ, CE4EM. **DK2XX** & DK6FT, DK8ZL, DL3ZBA. **DL0LI**: DL2MEH, DL2MDV, DL1GKS. **DK0HR**: DK9FE, DK5FA, DL2ZBN. **DK0IN**: Club Group. **DX1A**: DU1AU, DU1TDY, DU6TW/1, DU1AHS, DU1SAN, DU1CCK, DU1SW. **DX9HT**: DU9AA, DU6AF/9, DU9CV, DU9TV. **DX1CW**: 4F1FZ, 4F1FP, 4F1DMD, DU1CWM, DU1CJC, DU1DWY, DU1CWT, DU1EAA, DU1DSP, DU1COP, Max. **EA7GTG** & EA7GMA. **ED1DX**: EA1AK, EA1AU, EA1PJ, EA1AVN, EA1EMO. **ED3MM**: EA3DIF, EA3CAC, EA3FWE, EA3FJM, EA3FPR. **ED3QD**: EA3BOW, EA3BOX, EA3CVA, EA3DGQ, EA3EIO. **TW6A**: F6CTT, F6FYA, F6GLH. **FM5CL**: Club Group. **FJ0A**: FJ5AB, FJ5BC,FJ5BL, K2IBW/FJ. **TX0A**: FM5CD, F6BPX, F6GWV, FD1MAY, F6HMQ.

GB4PRS: Club Group. **GB8AU**: G4WMH, G4JYE, G4NCJ, G0AAF, G1MLK, G6WTM, G0IZM, G1XKJ, G7ASC, G7AQL, Kathryn, Guy, Dave, Robin, & Paul. **GB6SC**: G4XOM, G4YBT, G4IEB, G8ZMP, G0AGH, BRS-87212. **GB4CDX**: G4LJF, G3XTT, G3ZAY, G4DSE, G4JVG, G4FAM, G3OZF, G3XVR. **GB5HC**: G4UDU, G3SWC, G4LRP, G4TSN, G3NPF, G3OGP, G6ZWB, G4LKW, G0GMS, G4JHI, G3WZT, G4KDR, G1FJN, G3PYC, G3LEW. **GD4UFB**: GD0/DL1SCQ, GD0/DL2SCQ, GD0/DL3SBI, GD0/DL3SCR, GD1/DG2SA, GD7/DH1SAB, GD3HQR. **GB8PX**: GM4NNC, GM4TNJ, GM0EAS, GM6HWZ, GM6YQS, GM1OXQ, GM0AVB. **HA5KFZ**: HA5AFF, HA5AKK, HA5ALI, HA5AND. **HG1S**: HA1DAE, HA1AG, HA1DAC, HA1AH, HA1SV, HA1TD. **HG9R**: HA9OA, HA9RP, HA9RG, HA9PP, HA9RU, HA9RX. **HG6N**: HA6ND, HA6ON, HA6OQ, HA6NY, HA6NQ, HA6NF. **HG5A**: HA5UA, HA7RY, HA5GF, HA5OM, HA5AWH,

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HA5LN, HA5WE, HA5FM, HA5ML, Gyorgy. **HG7B**: HA5DW, HA7UG, HA7JAO, HA5WA, HA8FM, HA0DU.

HA5KKC: HA5LV, HA5MO, HA5MD, HA5OG, HA5KP, HA5MA. **HG6V**: Simon, Bocsi, Dienes, Peto, Vingender, Molnar. **HG8Q**: HA8LKE, HA8IE, HA8PG, HA8JP, HA8JV, Attila. **HA6KNX**: Jozsef, Gyula, Zsolt, Nandor. **HA5KDB**: HA5MY & HA5BBC. **HD2A**: HC2DZ, HC2FU, HC2CG, HC2JW, HC2AI, HC2AGT, HC2DG. **HL9OB**: HL9OB, HL9CU, HL9BL, HL9RAT. **I2EOW**: I2EOW, I2MQP, I2VXJ, IK2AEQ, IK2EGL. **IK4IEE**: IK4IEE, I4JMY, I4UFH, I4USC, I4YSS. **IS0QDU**: IS0QDU, IS0AEQ, IS0BWR, IS0CPU, IS0JOO, IS0WON. **JA1YJR**: JA0SWT & JR6GHN. **JA2YEF**: Tetsuya & Akiko. **JA3YQD**: JO1SYL, JG3NKP, JL3AOI, JE6MYI. **JA2YEC**: JR2RJI, JG2RNB, JK2IDE, JK2TAK, JI2XDF, JK2VTQ, Yasue, Tsuji, Yoshida, Miyoshi, Okamoto, Hisaoka, Yuko, Yumii, Tomoko, Chie. **JA4YJA**: JJ3LJU, JM3ILK, JF4BVU, JF4MIH. **JE2YRD**: JR2SCJ, JF2DQJ, JR7OMD, JI2KVW, JF2EOC, JF2VZU. **JA7YYL**: JA7FKF, JA7TYM. **JA7YAA**: JE7HLZ & JH0ORW. **JA8YBY**: JO1DFG, JH8GFB, JE8BRO, JE8KLL. **JA7YFJ**: JE7WQH, JR7MRQ, JR7OPP, JR7EFI, JE7LTP, JE7ENK, JE7XTQ, JE7MTI, JF7SWJ, JF7BJB, JG2XUR. **JA3YDH**: JA3BCT & JN3ACR. **JT1KAI**: Purew, Chuka, Sukhe. **KL7CQ**: KL7CQ, NL7NB, NL7MF, NL7LY. **KX6DC**: NZ8B & WB8SBH.

LA4O: LA4DLA, LA6EV, LA9EEA, LA9HW, LA4PGA, LA5KO. **LA1H**: LA6EDA, LA6DEA, LA7BFA. **AY6D**: LU1NCO, LU1DJU, LU3EZA, LU7EMZ, LU7ENP, LU7EVL, LU8EWD. **LR1V**: LU1VK, LU9VV, LU9VAB, LU1VV, LU1VNJ, LU1VPI, LU8VBC, LU7VCA. **LU4GF**: LU1GHD, LU1GGP, LU5GAY, LU2LB. **LZ1KVZ**: LZ1ZFI, LZ1-F-1941, LZ1-F-2081. **LZ9A**: LZ2PO, LZ2HE, LZ2DF, LZ2SC, LZ2CC. **OH1AD**: OH1PS & OH1WZ. **OH3AC/4**: OH3TY, OH3WK, OH3UM/4, OH4QF. **OH7AB**: OH7UE, OH7VR, OH7PF, OH7MA, OH7XM, OH2BSS. **OK2KPS**: Club Group. **OK1KSZ**: Club Group. **OK2KVI**: Club Group. **OK1ONI/P**: Club Group. **OK2KLI**: Club Group. **OK3KUN**: Club Group. **OK6DX**: OK2JS, OK2PZW, OK2PEM, OK2HBY, OK2PDK. **OK2KOD**: OK2WAZ, OK2BHM, OK2BDI. **ON6AH**: ON5AV, ON5IQ, ON7PC, ON6MH, ON6AH, ON6VL. **PA0KHS**: PA0ERA, PA0KHS, PA0NZH, PA3ADJ, PA3AWN, PA3EXH, PA3EYZ, PE1LBX, PE1LNK, PA3DQW, PE1FZK. **PA3CEF**: PA0VAJ, PA3DFT, PA3DWD, PA0COR, PA3CEE, PA3CEF. **SK2AT**: Club Group. **SP1PBW**: Club Group. **SP9PEY**: SP9CXX, SP9FKQ, SP9HMC, SP9RTF. **SP9PRO**: Club Group.

SP5PBE: SP5ANJ, SP5ELA, SP5FKW, SP5GIQ, SP5JTF, SP5LCT. **SP6PAX**: Club Group. **SP7PGK**: SP7MTR & SP7GSM. **YM2KC**: TA1E, TA1AC, TA2AD, TA1KA, KB6JCX/TA, YU3CB, TA2J, TA2AH, TA1AZ, TA2BE. **TD9G**: TG9RZ, TG9GI, TG9R, TG9HZ, TG9G. **UZ3DXW**: UA3-142-1770, UA3DDB, UV3DHK, UA3-142-1771, UA3-142-1925. **UZ6HXK**: UA6-108-1838, UA6-108-1867, UA6-108-1857. **UZ4UWC**: Victor Kochkurov & Alex Yutkin **UZ3QYA**: Alex Arifov, Alex Glushhenko, Alex Rumyantsev. **R1WO**: Molokov, Suslov, Moseyev. **UZ3QZO**: UV3QLR & UA3-121-1658. **UZ4YWW**: UA4-097-33 & UA4YEP. **UZ3SWL**: UA3-151-847, UA3-151-822, UA3-151-837. **UZ4FWE**: UA4-148-662, UA4-148-602, UA4-148-711, UA4FU. **UZ4AWB**: UA4-156-076, UA4-156-1108, UA4-156-9861. **UZ3MWD**: UA3-168-640, UA3-168-1100, UA3-168-667. **UZ1QWW**: Victor Antonov & Sergej Smirnov. **UZ3AXX**: UV3AAC, UA3-142-204, RA3DUU, UA3-170-1076. **UZ4PZZ**: UA4PMP, UA4-094-1094, UA4-094-1097. **UZ6AXJ**: Oleg Doroshenko, Alex Mironenko, Igor Birukov.

UZ1OWZ: Minaev, Antipov, Shestakov. **UZ4SWF**: Dmitry Loklev, Nikolay Kovtun, Aleksey Bahtin. **UZ6LWZ**: UA6-150-1336, UA6-150-1403, UA6LUQ. **UZ6XWC**: UA6XHO, UA6-087-315, UA6-087-320. **UZ3DXS**: UA3DSY, UA3DRL, UA3-142-864. **UZ3DYF**: Igor, Alexander, Oleg. **UZ4FWA**: Club Group. **UZ0QWA**: UA0QCA, UA0QAG, UA0QIO, UA0QEL. **UZ0QWT**: Sergej Yu. Karakata, Vitaliy Glinskij, Vladimir Kolomijcev. **UZ0OWO**: Club Group. **UZ0SXF**: UA0SLZ, UA0SNR, Yury Volynec. **UZ0QWB**: UB5-073-1738/UA0Q & UA0QAH. **UZ0QXU**: UA0QEZ, UA0-098-1626, UA0-098-210, UA0-098-209, UA0-098-1681, UA0-098-206, UA0-098-207, UA0-098-236, UA0-098-220, UA0-098-221. **UZ0AXX**: UA0AGI, UA0-103-239, UA0AFC, UA0-103-215. **UZ1NWO**: Kotomkin, Mezeliainen, Nikitin. **UZ9UZL**: Serge Lezin, Nick Bakarev, Igor Alekseenko. **UZ9XWV**: UA9-090-1053 & UA9-090-1058. **UZ9XYN**: Vladimir Chebotarev, Valery Kovalev, Ivar Berg. **UZ9CWW**: UA9CJK, UW9CW, UA9CIR, UA9CPB, UA9CDT, UA9CDC, RV9CWB, RV9CFA. **UZ9MWV**: Oleg Frolov & Vyacheslav Skuratov. **UZ9CXA**: Trenin, Glazunov, Kochetov. **UZ9JWD**: UA9JFR, UA9JDS, RA9JB, RA9JG, UA9JFQ. **UV9UWW**: UA9UHN, UA9UPL, UA9UDI, UA9UD. **UZ9CYP**: UA9CUA, UA9-154-2105, UA9-154-2179.

RZ9OWA: UA9OF, UA9OFB, UA9OLW, UA9-145-207, UA9-145-206, UA9-145-431. **UB4IZA**: UB3IBZ, UB5-073-4207. **UB4TWL**: Club Group. **UB4RWW**: Club Group. **UB4VWA**: Aartugin, Didenko, Fomichenko, Ovcharenko. **UB4MZA**: UB5MNO, UB5MNM, UB5MED. **UB4MWA**: UB5MDA, UB5MDD, UB5MMR. **UB4WYH**: UB5WFA, UB5WBJ, UB5-068-866. **UB4WZW**: Vlad Aoejev, Serg Krivohizh, Alex Shishlyk. **UB4IWN**: UT5SI, UB5-073-4328, UB4IRI. **UB2JWS**: Ernev Constantia, Evgeni Kurilin, Kirill Vedenski. **UT4UWE**: UT5UDI, UB5ULJ, UT5UGI. **UB4LWP**: Boris Severinsky & Andrej Lubentsov. **UT4UWL**: Moroz, Bessalov, Golovka. **UC1AWP**: Club Group. **UC1AWK**: UC2LCQ, UC2AHZ, UC2AIA, UC2-188-58, UC2-188-181. **UC1AWE**: UC2AGO, UC2AGJ, UC2AGB. **UF7FWM**: UF6-012-457, UF6FFH, UF6AW. **UG7GWO**: Kazen Karapetyan, Kazen Pylyzian, Robert Grigezyan, UG6GAT, UG6GFF, UF6GAW. **UH9HWB**: UH8HAI, UH8AAS, UH8ABI. **UI9AWH**: UI8ACR, UI8AAY, UA8AGH.

UI9BWK: RL7PA/RI5, UI8-053-2089, UI8-053-2111. **UL8CWW**: Steve Teleshev, Alex Polukeev, Victor Filipenko. **RL8PYL**: UL7PL, UL7PAE, UL7PCZ, RL7PHL, RL8PY. **UL8LYA**: UL7LER, UL7LEZ, UL7LEG UL7LO, RA6XA, UL7-026-177. **UL8LWA**: UL7-026-653 & UL7-026-623. **UO4OWR**: Alexey Sirotin, Oleg Bivol. **UP1BZG**: UP2QA, UP2BCO, UP2BCT, UP2-038-439. **UP1BZL**: UP2BNB, UP2BNW, UP2BBL. **UP1BYC**: Vita Ignotaite, Nina Ignotiene, UP2-038-2504. **UP1BYT**: Eitchas, Dambraus, Ziuraitis. **UP1BYL**: UP0BA, UP2BKW, UP2BMW, UP2BO, UP2PX, UP2-038-1162. **UP1BZQ**: UP2BAT, UP2BMQ, UP2-038-1682. **UP1BWB**: UP2-038-729, UP2BLU, UP2-038-1220. **UP1BZM/A**: RP2BIV, UP2-038-1787, UP2-038-1833. **UP1BZO**: UP2BMX, UP2BQN, UP2BNC, UP2-038-1751, UP2-038-346. **UP1BYK**: UP2BJV, UP2BYF, UP2BAH. **UQ1GWW**: UQ2-037-83, UQ2-037-116, UQ2GAG, UQ2GLK. **UQ1GYQ**: UQ2GKG, RQ2GGK, UQ2-037-306. **UR1RWQ**: Alekcejev, Ignatjev, Korjavko. **UR1RWL**: UR2RAH, UR2-083-1547, UR2-083-1543. **UR1RWX**: UR2RRR, UR2RJ, UR2RHF, UR2RDJ, UR2RNT, UR2RNA, UR2RNX.

UR1RYA: Erkki Sadrak & Meelis. **WC6H**: WC6H, NC7K, N6EE, W6REC. **NW0F**: NW0F, AK0A, KB0U, KM0L, NT0P. **N3BB/5**: N3BB, WN4KKN, N5TR, WD5N. **ND3A** & WB3FSB. **N6VR** & K6XO. **WC4E**: WC4E & K4XS. **K0LIR**: AA0A, KA0DQI, KB0KK, WF0E, NY0S, W0HBH. **KI1G**: KI1G, K1NG, KD2SX. **KD8B**: KD8B & Computer. **N4WW**: N4WW, NX4N, K0LUZ. **NV4G**: NV4G & NU4B. **NZ5I**: NZ5I, W5ASP, N5EA, K5RVK, WA5ZVE, KJ5Y. **KI6P**: K3EST, K6TMB, N6IG, N6RO, WA6VEF. **NE8T**: NE8T, N8CXX, N8BTU, K8JM. **N7TT**: N7TT & Daughter Cheryl. **KQ3V**: WA3LFY, N3CHL, WB3EPW, K3ZLI, KA3PKN, KA3PDY, KQ3V. **KS3F**: KS3F, NE3F, WB2LEE. **NG0X**: NG0X, WB0ZOS, KA0JNG. **KA5W**: KR0Y & KO9Y. **XO5FX**: VE5FX, VE5GHC, VE5ELJ, VE5RC, VE5IR, VE5DJO, Bernie. **VE1IDX**: VE1CIT, VE1BIG, VE1BII, VE1BZO, VE1UA, VE1BIE, VE1VBL, VE1BZX, Linda. **VE5QST**: VE5GF, VE5OT, VE5AGA, VE5AEO. **VE6SF**: VE6SF & VE5FN. **VE3VOW**: VE3OIL, VE3NPB. **VE6WP**: VE6WP & VE6BBP. **VK1GB**: VK1GB, VK1ST, VK1PM, VK1PJ, VK1KCM. **4C2C**: XE2ABA, XE2GDD, XE2PPT, XE2PQ. **XE1JME**: XE1JME, XE1AQK. **Y74CG**: Y74ZG & Y74WG. **Y57CA**: Y31PA & Y57ZA.

Y38I: Y21JI, Y23WI, Y26DI, Y44TI, Y44UI, Y44XI. **YE4X**: YB0TK, YB0DPO, YB0SY, YB0EMJ, YB4FNN. **YB0AQL**: W6KG & W6QL. **YS0YS**: YS1GMV, YS1FAF, YS1TG, YS1OD, YS1UG, YS4GV. **YZ4J**: YU4RR, YU4NW, YU4RW. **YT3T**: YU3BQ, YT3EW, YU3HR. **4N2Y**: Club Group. **YU3AI**: YU3AI, YU3EO, YU3BM, YU3MM. **YT4D**: YU4AR, YU4FA, YU4LA, YU4NC, YU4RS1008, YU4RS1037. **YZ2S**: YU2FM, YU2AF, YU2RS-817, YU2RS-764, Zlatko, Pero, Gojko. **4N4K**: Club Group. **4N4D**: Boris & Zeljo.

Multi-Operator Multi-Transmitter

5K7U: HK7II, HJ7MQC, HK7DOX, HK7BEI. **ED4UPM**: Julio, EC4BOA, EA4RB, LU1BSN/EA4, EA4CMF, EA4DAE, Jose Manuel, Juan, Manolo, Jose Luis, Javier, Pedro, Juan Antonio, Loris. **I03KVW**: I3KVW, I3QJZ, I3JSS, I3FIY, I3MAU, IV3YYK, IV3WMP, I3BYT, I3ON. **JA1YCV**: Club Group. **JA1YFG**: JO1RUR, JO1TNZ, JP1LTW, JQ1BRW, JG2QWF, O. Hosokawa. **JA9YBA**: JA9VDA, JH9VSF, JA9-10148, JH9KIF, JR8GOU, JR9AGA, JJ3URK, JR0BAK, JH9SSU, JP3CJH, JR9EUZ. **KH6XX**: KH6XX, KH6ND, WH6BGI, N5CT/KH6, 4X6AI/KH6, KH6BZF, Lulu. **WL7Y**: WL7Y, KL7Y, KL7U, KL7HFA, WL7E, NL7GP, NL7MW, KL7VC. **KL7RA**: KL7RA, AL7HC, AL7CQ, NL7V, NL7KB. **LZ1KDP**: LZ1JY, LZ2UU, LZ1BB, Willy, Anna, Yanko, Rady, Vasco, Orlin, Jane, Plamen. **PI4DEC**: PA0BOE, PA0TUK, PA3AWW, PA3CJF, PA3CZW, PA3DPK, PA3ENO. **UP4A**: UP2BAW, UP2BIG, UP2BIL, UP2BNZ, UP2BRF, UP2BRJ, UP2PAJ. **NB6L**: AK6T, K4UVT, K6ZM, NB6L, NP4IW, W9RR. **KC3EK**: KC3EK, NW5E, K1DQV, KN3P, W3HXI, K3ZZ, WB2EKK, WA3EKL. **AX9LZ**: JG3KUT, JH4NMT, JH9GRK, JH9JFH. **Y34K**: Y24UK, Y23EK, Y22TK, Y42MK, Y42LK, Y42GK, Y42QK. **YT2R**: YU2MY, YU2HO, YU2QS, YU2GR, YU2DQ, YU2OH, YU2MP, YT2AA, YT2FI, YT2GW, YT2HG, YU2OG.

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America's Communications Leader Presents Its All-New 10-Meter SSB/CW Mobile Transceiver

Realistic, America's premier brand of scanners, CB radios and satellite TV systems introduces the HTX-100, the perfect first rig for a beginning Ham and a superb 10-meter mobile radio for any amateur. It's compact, yet loaded with "big rig" features.

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Ultracompact and includes everything you need for underdash installation

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You can select 25-watt or 5-watt QRP power output from the front panel. The HTX-100 has a backlit LCD frequency display with mode and tuning-step indicators. You also get a 5-step LED signal/RF power meter, noise blanker, hefty 3-watt audio output, high-quality built-in speaker, front-panel headphone jack and a rear-panel jack for adding an external speaker.

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CIRCLE 144 ON READER SERVICE CARD

CONTINENTAL LEADERS

ASIA

AB	AT0T	3,515,148
28	4X3M	1,559,691
21	4Z5UX	2,586,551
14	UA9MA	2,336,652
7	UA9CSS	865,940
3.5	No Entrant	
1.8	No Entrant	

OCEANIA

AB	**N7NR/NH6**	**5,818,692**
28	YC0EAQ	1,491,815
21	YC9VGJ	1,144,066
14	N7DF/WH2	3,156,090
7	KH2F	751,688
3.5	AH6AZ	492,030
1.8	No Entrant	

AFRICA

AB	**EA9IE**	**12,024,365**
28	EA8VV	1,158,578
21	ED8ACH	3,220,158
14	CT3DL	2,869,536
7	No Entrant	
3.5	No Entrant	
1.8	CT3DZ	96

SOUTH AMERICA

AB	**P40V**	**12,324,780**
28	**ZY5EG**	**7,372,512**
21	**ZP5Y**	**8,939,514**
14	**ZZ5EG**	**8,219,627**
7	HJ3NTI	67,824
3.5	HK3JJH	68,340
1.8	No Entrant	

EUROPE

AB	**TW5E**	**3,548,160**
28	OK3YX	262,185
21	4N4A	2,716,816
14	YU1KQ	1,744,618
7	**HA9RE**	**1,078,640**
3.5	IO5MXX	891,330
1.8	CT1AOZ	82,592

MULTI-SINGLE

AF	5H1HK	7,369,926
AS	H22H	10,913,771
EU	LZ9A	8,708,610
NA	FM5CL	10,971,504
OC	YE4X	7,910,724
SA	**TX0A**	**16,530,415**

NORTH AMERICA

AB	**VP2ML**	**7,589,153**
28	KY5N	438,140
21	NP4CC	3,770,688
14	**VO1QU**	**3,276,840**
7	HI3HCE	667,980
3.5	VE2ZP	1,008,844
1.8	VE3PN	34,596

MULTI-MULTI

AF	No Entrant	
AS	JA9YBA	3,980,106
EU	UP4A	13,710,895
NA	WL7Y	9,513,010
OC	**KH6XX**	**24,959,649**
SA	5K7U	781,560

CONTINENTAL LEADERS BAND-BY-BAND BREAKDOWN

		160	80	40	20	15	10
AF	EA9IE	11	512	451	1373	1451	19
AS	AT0T	0	0	165	332	1226	1226
EU	TW5E	13	242	423	700	679	28
NA	VP2ML	0	0	62	1397	1225	1444
OC	N7NR/NH6	3	81	462	813	853	740
SA	P40V	0	81	576	1267	1224	1336
USA	KM1H	0	296	7	1206	755	32

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, ande Prefixes. Certificate winners are listed in boldface.

QRP/p SECTION WORLDWIDE

4X6IF	**A**	**879,860**	**899**	**370**
RA0JJ	**A**	**426,153**	**1085**	**273**
WC7Q	**A**	**414,462**	**750**	**402**
				(Op. K7SS)
YU2TV	**A**	**312,244**	**495**	**311**
FD1BEG	**A**	**215,809**	**439**	**253**
UW3RR	**A**	**148,800**	**368**	**192**
ID0KHP	**A**	**141,482**	**317**	**218**
VE3NVP	**A**	**139,460**	**270**	**190**
RB5IIU	**A**	**98,175**	**255**	**165**
UA9SG	**A**	**95,654**	**287**	**169**
YO7LCB	**A**	**86,944**	**250**	**152**
JH8DEH	**A**	**83,798**	**236**	**143**
UA3XEF	"	78,600	232	150
OH5NHI	**A**	**71,610**	**234**	**155**
LA1XDA	**A**	**68,888**	**288**	**158**
WB6JMS	**A**	**68,052**	**236**	**159**
KB3TS	**A**	**54,528**	**170**	**142**
KB7M	"	35,800	138	100
IS0LYN	**A**	**34,040**	**135**	**115**
AA2U	**A**	**28,080**	**144**	**120**
PA2PDN	**A**	**25,100**	**178**	**100**
Y25MO	**A**	**22,072**	**130**	**89**
GW0ARK	**A**	**20,806**	**154**	**103**
CX8DT	**A**	**13,338**	**66**	**54**
JH7AJD/1	"	11,968	73	64
DL4UE	**A**	**8,525**	**71**	**55**
N6NF	"	8,100	75	60
UV3TD	"	7,076	61	28
YU1KN	"	6,528	58	48
RA3DQP	"	5,720	63	51
YO5BWO/6	"	4,300	57	50
WA7TUX	"	3,243	59	47
WA7NWL	"	2,520	46	40
Y23TL	"	2,016	40	32
YO3BDP	"	495	23	15
PY1ACV	**28**	**75,740**	**201**	**140**
JH9HXF/1	**28**	**53,850**	**208**	**150**
ZS6PT	**28**	**39,750**	**130**	**106**
EA4CFN	**28**	**21,252**	**102**	**77**
EA3FQV	"	11,718	78	54
VE3HX	**28**	**11,222**	**73**	**62**
UR2RCD	**28**	**3,663**	**37**	**33**
UA0SG	**28**	**1,886**	**47**	**41**
KB4IOS	**28**	**988**	**21**	**19**
UJ8XA	**28**	**986**	**28**	**27**
RW6AC	**21**	**200,196**	**401**	**268**
RB5GD	**21**	**140,658**	**284**	**197**
UO5ONQ	**21**	**134,050**	**301**	**175**
IK6ATS	**21**	**83,700**	**228**	**155**
N1AFC	**21**	**66,588**	**242**	**186**
W6CN	**21**	**55,180**	**208**	**178**
JG4FAX	**21**	**46,835**	**199**	**95**
JA8RJE	"	35,643	159	109
UB5YDY	"	29,842	137	86
UD6DFF	**21**	**23,124**	**121**	**82**
UC2OGE	**21**	**20,169**	**108**	**81**
RA3GD	"	**11,144**	**79**	**56**
UB5AEO	"	9,275	69	53
RV6AB	"	8,500	59	50
UA3DPX	"	6,912	60	54
SP4GFG	**21**	**6,885**	**61**	**45**
UA3MDV	"	6,223	55	49
ON8WN	**21**	**2,400**	**41**	**32**
ZL1AX8	**14**	**230,160**	**340**	**240**
JA2JSF	**14**	**67,626**	**200**	**153**
VE1AGZ	**14**	**25,608**	**102**	**97**
RZ3DC	**14**	**12,878**	**113**	**94**
PA0NRD	**14**	**10,626**	**116**	**77**
OK3CXS	**14**	**1,288**	**37**	**28**
JA2BNN	"	893	26	19
W6YVK	**14**	**589**	**20**	**19**
WB2GDD	**14**	**476**	**30**	**28**
OZ3PE	**14**	**399**	**21**	**21**
UB5MMP	**7**	**43,460**	**145**	**106**
IK8CHL	**7**	**10,980**	**77**	**61**
YO5COJ	**7**	**4,320**	**50**	**45**
UB4JO	"	600	22	15
JF2LTH	**7**	**494**	**19**	**19**
OK1FGC	**3.7**	**52,882**	**196**	**137**
OK1JJF	"	52,008	205	132
UB5IRN	**3.7**	**41,420**	**174**	**109**
OK3CTT	"	37,332	154	122
SP9EQG	**3.7**	**4,692**	**56**	**46**
KH6CP /WW1	**3.7**	**520**	**31**	**26**
EA1DVY	**3.7**	**80**	**9**	**8**

SINGLE OPERATOR NORTH AMERICA

UNITED STATES

KM1H	**A**	**4,078,912**	**2296**	**782**
				(Op. KQ2M)
NJ1F	**A**	**802,196**	**1081**	**502**
NQ1K	"	411,668	591	388
NJ1V	"	296,064	825	384
KZ1K	"	162,560	600	320
				(Op. K1PLX)
K1CC	"	115,322	311	218
KU1X	"	90,200	299	205
KA1NXT	"	7,056	73	72
W1WY	**28**	**1,392**	**26**	**24**
K1TR	**21**	**301,550**	**646**	**370**
NI8L/1	"	226,980	400	260
WA1FCN	"	69,650	221	175
K1KJT	**14**	**526,164**	**865**	**418**
W1BWS	"	388,648	545	404
KY2J	**A**	**1,381,097**	**1244**	**593**
WB2Q	**A**	**1,081,062**	**983**	**522**
KF2O	"	619,556	657	406
KS2M	"	419,616	551	372
AB2E	"	338,052	650	394
KB2SE	"	211,464	378	264
W2HG	"	140,094	339	258
KD2HE	"	68,940	260	180
W2FUI	"	43,920	158	122
KT2D	"	30,504	158	124
WA2HMM	"	21,489	107	87
K2OLG	**28**	**68,853**	**217**	**177**
W2KZE	"	20,286	111	98
N2AZS	"	13,760	88	80
KB2DUH	"	513	27	27
KE2BA	**21**	**262,178**	**507**	**307**
W2PHW	**14**	**48,960**	**159**	**144**
K2GI	"	39,593	144	137
KD2RD	**7**	**252,192**	**612**	**296**
NO2I	**3.7**	**67,784**	**196**	**148**
K3ZO	**A**	**1,746,506**	**1325**	**601**
K3MD	**A**	**171,598**	**335**	**238**
WB3BRF	"	77,280	381	230
KB3TS	"	54,528	384	142
K5ZD/3	"	41,055	132	115
KA3AVB	"	1,845	48	41
WB3CDX/N	**28**	**23,640**	**180**	**120**
K3IPK	**21**	**387,828**	**658**	**378**
NK3U	"	27,830	136	121
WA3VPL	"	3,600	46	45
KA3OER	14	210	10	10
W3BGN	**1.8**	**22,468**	**122**	**82**
WX4G	**A**	**2,938,848**	**1922**	**736**
AI2C/4	**A**	**864,224**	**849**	**478**
AB4ES	**A**	**387,260**	**559**	**335**
W4WJJ	"	220,844	398	274
N4MM	"	185,465	272	245
WA4VEK	"	145,071	318	243
W4WKQ	"	123,860	302	220
W4TMN	"	101,146	264	206
KJ4TI	"	85,618	250	178
WB4FTI	"	82,410	258	205
HK3GZBW4	"	79,296	410	177
WK4F	"	75,840	198	158
WA0WAU /4	"	33,062	155	122
W4KMS	"	32,340	161	132
W4UYC	"	23,391	148	113
K4OD	"	10,148	67	59
K4PI	"	7,540	54	52
WB4UBD	"	768	17	16
N4REE	"	496	19	16
N4EJV	**28**	**395,948**	**854**	**358**
WB6BRW /4	"	21,996	176	117
WB4VQO	"	17,347	93	83
KC4BIO	"	882	21	21
AI4R	**21**	**877,728**	**1100**	**492**
WA4FBH	**21**	**760,665**	**853**	**471**
KF4HK	"	389,487	565	357
KF4GW	"	75,256	213	184
KK4RV	"	40,960	205	160
WF7B/4	**14**	**521,807**	**804**	**451**
W4CYC	"	159,960	323	258
W4YN	"	8,320	80	80
AA4MM	**1.8**	**12636**	**134**	**78**
NR5M	**A**	**3,332,700**	**2360**	**805**
WM5G	**A**	**2,256,632**	**1554**	**683**
				(Op. K5RX)
KI3L/5	**A**	**805,374**	**1096**	**443**
NT5V	"	461,560	1031	440
WU5Z	"	224,000	634	350
WA5IYX	"	202,912	465	272
N5IET	"	137,611	359	241
NX8G/5	"	33,872	225	146
W5EIJ	"	27,489	188	147
WA5JDU	"	21,948	147	118
KY5N	**28**	**438,140**	**1154**	**380**
K5MK	**28**	**112,677**	**365**	**213**
KC5CP	"	68,796	244	126
K5ZD	"	7,332	136	78
WB5YIW/T	**28**	**5814**	**62**	**51**
WB5VZL	**21**	**1,886,276**	**1857**	**667**
WF5E	**21**	**754,380**	**1254**	**540**
WA5OYU	"	39,750	203	159
K5TSQ	"	30,736	182	113
W5FO	**14**	**203,565**	**673**	**371**
NW5H	"	59,024	440	238
K5RR	**7**	**277,200**	**606**	**275**
				(Op. AA5DX)
N6CL/5	**3.7**	**21,576**	**124**	**116**
WB5YLT	"	20,640	147	120
K5UR	**1.8**	**28,248**	**274**	**132**
K6HNZ	**A**	**2,093,253**	**1566**	**529**
KI6CG	**A**	**883,482**	**963**	**458**
K6EID	**A**	**468,832**	**597**	**364**
WW6O	"	443,188	755	404
N6JV	"	253,672	522	296
WA6UFY	"	109,400	300	200
W6ABW	"	66,582	226	162
WA8LLY/6	"	53,960	179	142
NE6I	"	49,610	154	121
N6NMH	"	46,324	197	148
KD6NT	"	32,400	124	100
K6ICS	"	23,542	107	79
KE6WL	"	21,736	106	88
W6LC	"	15,886	110	95
KJ6DL	"	6,956	91	74
K6SVL	**28**	**283,716**	**915**	**333**
KH6DW /KS6	**28**	**181,905**	**1476**	**335**
N6JM	"	5,985	53	45
KA6ING	"	5,766	79	62
KJ6AW	**21**	**40,996**	**191**	**148**
KM6B	**14**	**1,319,830**	**1489**	**590**
WX6M	**14**	**669,475**	**953**	**439**
NM6L	"	22,538	131	118
K6LRN	"	8,541	75	73
AJ6V	"	2,415	39	35
K6NA	"	1,242	23	18
N6LL	**1.8**	**990**	**42**	**33**
KE7EQ	**A**	**1,306,588**	**1247**	**514**
NY7T	**A**	**370,608**	**586**	**336**
WG7A	**A**	**314,592**	**570**	**339**
KA7EOS	"	261,871	418	307
W7GUR	"	135,216	286	216
KC7UP	"	130,240	305	220
WK7V	"	129,052	1174	308
N7RO	"	123,847	445	271
W7QN	"	66,000	201	165
W7EKM	"	19,170	99	90
KC7V	"	15,876	200	108
NC7O	"	6,554	64	58
W7TJA	"	1,850	39	37
N7JZW	"	330	16	15
WJ7S	**28**	**62,075**	**332**	**191**
WA7KLK	"	35,192	500	166
W7AYY	"	32,630	242	130
KA7WPD/T	**28**	**31,640**	**355**	**140**
WJ7R	**21**	**377,559**	**566**	**273**
W7FP	**21**	**336,396**	**758**	**388**
AI7B	**14**	**1,065,207**	**1084**	**507**
WC7S	**1.8**	**2,268**	**82**	**42**
N8BJQ	**A**	**613,785**	**799**	**415**
WA8YTM	**A**	**286,440**	**566**	**372**
WB8O	"	162,597	365	249
K8CV	"	94,772	243	172
N8II	"	82,656	218	168
NS8O	"	59,285	239	167
NW8M	"	37,422	141	126
WB8SFF	"	29,290	109	101
KE8NH	**28**	**6,080**	**76**	**64**
KA8ZHC/T	**28**	**35**	**7**	**7**
N9AG/8	**21**	**514,960**	**712**	**410**
WB8TLI	**21**	**132,466**	**275**	**214**

Say You Saw It In CQ

W8IMZ	"	108,432	262	216
N8FEH	"	65,913	237	173
K8GSR	"	21,240	140	118
K8KUH	**14**	**45,864**	**177**	**156**
W9NSZ	**A**	**553,113**	**770**	**407**
KBØC/9	**A**	**301,788**	**535**	**332**
KC9EW	"	203,136	387	276
NG9L	"	178,220	390	268
WB9HRO	"	127,414	434	266
NX9T	"	19,740	120	94
NI9C	"	13,932	104	86
NX9M	"	2,610	50	45
KR9G	**28**	**20,736**	**143**	**108**
N9GMM/T	**28**	**2,646**	**54**	**42**
N9GFG	"	14	7	7
NJ9Q	**21**	**46,306**	**209**	**169**
KQ9L	**14**	**773,685**	**1032**	**521**
N9HCA	"	74,100	436	260
W9REC	"	1,521	39	39
AG9S	**7**	**85,626**	**427**	**201**
KBØG	**A**	**811,305**	**1133**	**495**
KVØI	**A**	**617,684**	**1497**	**503**
NØZA	"	326,268	524	324
KC9C/Ø	"	220,281	525	303
NSØB	"	96,408	281	206
KSØT	"	77,616	451	252
KFØT	"	71,556	242	178
WØPPF	"	24,200	191	146
NYØR	"	16,185	95	83
WAØDCB	"	15,189	100	83
AKØW	"	14,651	108	91
WØKEA	"	13,706	100	77
NØGVT	"	928	35	32
NØHJQ/T	**28**	**27,057**	**135**	**87**
WBØZKG/T	"	18,795	161	105
WBØGFV	"	5,760	54	48
NØIDH/T	"	399	21	19
KS9J/Ø	**21**	**6,084**	**93**	**78**
KVØQ	**7**	**644,744**	**693**	**332**
WØRXL	"	15,688	79	74
WB8ZRL/Ø	**3.7**	**20,492**	**125**	**109**
W9RXJ/Ø	**1.8**	**1,764**	**69**	**49**

DOMINICAN REPUBLIC

HI3AMF	**A**	**156,177**	**386**	**201**
HI3HCE	**7**	**667,980**	**572**	**270**
HI3EMS	**14**	**2,010,476**	**1771**	**533**
HI8LC	"	58,000	160	145

ALASKA

NL7DU	**A**	**177,300**	**320**	**225**
KL7AF	**3.7**	**53,738**	**130**	**97**

U.S. VIRGIN IS.

W8KKF /WP2	**A**	**1,341,112**	**1507**	**424**

PUERTO RICO

KP4CZ	**A**	**53,888**	**165**	**128**
NP4CC	**21**	**3,770,688**	**2552**	**656**

BELIZE

V31KA	**A**	**632,832**	**959**	**309**
			(Op. KM5R)	

CANADA

VE6OU/3	**A**	**4,106,793**	**2014**	**661**
VE5UF	**A**	**1,087,384**	**1212**	**436**
VE3BXY	"	312,674	383	254
VE6BS	**A**	**304,434**	**623**	**234**
VE7XO	**A**	**153,648**	**289**	**198**
VE3EZU	"	81,801	199	149
VE7HAM	"	52,578	171	127
VE3NBE	"	38,295	125	115
VO1AW	**A**	**24,795**	**110**	**95**
VE1VCM	**A**	**22,352**	**106**	**88**
VE6BMX	**28**	**67,137**	**238**	**139**
VE3VET	**28**	**10,500**	**73**	**60**
VO1MP	**21**	**2,564,617**	**1865**	**583**
VE3BVD	**21**	**1,579,725**	**1308**	**525**
VE3HO	"	1,037,390	918	457
VE2EW	**21**	**66,768**	**182**	**156**
VE1ZJ	**21**	**44,896**	**236**	**122**
VE3OTK	"	40,625	153	125
VO1QU	**14**	**3,276,840**	**2041**	**664**
CI8C	**14**	**1,339,763**	**1115**	**479**
			(Op. VE3ICR)	
VE5RA/6	**14**	**1,101,849**	**987**	**497**
VE7EIK	**14**	**977,500**	**1008**	**425**
VE2ZP	**3.7**	**1,008,844**	**666**	**358**
VE1DX	**3.7**	**164,304**	**240**	**168**
VE3PN	**1.8**	**34,596**	**150**	**62**

MONTSERRAT

VP2ML	**A**	**7,589,153**	**4128**	**803**

MEXICO

XG1ALH	**14**	**282,100**	**469**	**260**
XE2VHK	**7**	**24,480**	**95**	**68**

AFRICA

NIGER

TU4BR /5U7	**A**	**4,957,675**	**2526**	**655**

LESOTHO

7P8DP	**A**	**2,402,718**	**1525**	**529**

ZAMBIA

9JØA	**A**	**4,372,136**	**2346**	**628**
			(Op. 9J2EZ)	

BOTSWANA

A25/ZS6P	**28**	**1,154,941**	**1002**	**389**

MOROCCO

CN8FC	**28**	**421,890**	**590**	**245**
			(Op. WA4UAZ)	

MADEIRA IS.

CT3BD	**28**	**32,944**	**84**	**69**
CT3DL	**14**	**2,869,536**	**1698**	**568**
CT3DZ	**1.8**	**96**	**16**	**14**

CANARY IS.

EA8VV	**28**	**1,158,578**	**988**	**398**
ED8ACH	**21**	**3,220,158**	**1795**	**601**
EA8AVV	"	119,922	474	253

CUETA

EA9IE	**A**	**12,024,365**	**3707**	**865**

IVORY COAST

TU4BU	**14**	**408,144**	**536**	**264**

NAMIBIA

ZS3/DL8 ZBL	**A**	**276,012**	**388**	**246**

ASIA

ISRAEL

4X3M	**28**	**1,559,691**	**1637**	**399**
			(Op. 4X6MH)	
W3FYT/4X	"	581,565	799	283
4X6DK	"	144,072	360	184
4Z5UX	**21**	**2,586,551**	**1820**	**517**
			(Op. 4Z4UX)	
4X6UL	**14**	**1,242,571**	**1093**	**407**

NEPAL

9N1MC	**A**	**6,950**	**88**	**50**

SINGAPORE

9V1WU	**A**	**454,168**	**1060**	**286**

KOREA

HL9FN	**A**	**86,880**	**288**	**160**
HL9CA	"	5,750	62	50
HL1ABR	**21**	**20,080**	**106**	**80**
HL1LW	**14**	**180,605**	**567**	**205**

JAPAN

JE4VVM	**A**	**1,909,990**	**1408**	**491**
JR6PGB	**A**	**1,833,076**	**1467**	**476**
JH4UYB	**A**	**1,831,423**	**1434**	**503**
JA8RWU	"	1,447,600	1155	470
JF1SEK	"	1,310,982	1113	453
JR3BOT	"	431,333	557	301
JI3AUD	"	205,933	381	217
JE7HFL	"	193,000	361	200
JHØSPE	"	186,200	359	200
JM1SOX	"	157,688	348	184
JG1UZD	"	151,430	333	190
JR6IIB	"	145,885	296	179
7J3ABC	"	141,777	332	177
JA1WYQ	"	99,996	255	156
JA7JH	"	98,912	183	176
JF6JQM	"	85,973	232	149
JA8SW	"	82,634	203	158
JA6AKV	"	71,442	200	147
JF6KAC	"	69,012	191	142
JA3UWB	"	58,674	167	127
JE4CIL	"	45,500	138	130
JE1AER	"	41,535	163	117
JG2TSL	"	39,456	150	96
JA1ALX	"	37,851	136	111
JH1UUT	"	36,720	154	108
JH3TXP	"	26,208	115	96
JA1ASO	"	25,500	109	85
JA7VSO	"	24,867	87	81
JG6TXZ	"	22,344	115	84
JA6BWH	"	21,507	117	67
JA1BNW	"	21,252	118	77
JH6IOM	"	14,212	77	65
JRØXOJ	"	11,596	64	52
JI6OWY	"	10,860	73	60
JE6GIQ	"	10,850	74	50
JI2LCE	"	10,465	89	65
JO3DWD	"	4,960	49	40
JA9CWJ	"	4,704	50	42
JI2MBQ	"	4,500	55	45
JJ6CQW	"	4,144	44	37
JG1REU	"	2,550	33	30
JE3DYW	"	2,375	31	25
JA5IP	"	2,100	40	21
JAØGZ	"	400	20	20
JH1LBR	**28**	**209,306**	**441**	**229**
JH1BXH/Ø	**28**	**163,413**	**340**	**201**
JH5GHM/1	"	148,000	355	200
JJ1TBB	"	144,530	357	194
JR3RWB	"	93,576	261	168
JF7UEM	"	44,772	169	123
JRØBQT	"	43,424	173	118
JH9WQO	"	22,304	113	82
JA1FO	"	15,552	91	72
JA1AAT	"	9,152	68	52
JH2KGZ	"	3,432	43	33
JA3RBC	"	3,159	40	27
JF2KUU	"	1,386	26	21
JR6GKT	**21**	**1,476,408**	**1223**	**454**
JA3YKC	**21**	**1,470,116**	**1180**	**467**
			(Op. JI3ERV)	
JA1YXP	**21**	**997,864**	**961**	**412**
			(Op. JO1JOZ)	
JE3ZFS	"	895,375	912	377
			(Op. JI3JGJ)	
JM1XCW	"	703,656	785	348
JE6URC	"	618,520	684	329
JG2FDF	"	436,008	618	296
JA7QFU	"	383,145	541	267
JA7JPK	"	323,472	500	276
JHØUSD	"	300,609	482	263
JH9CAU	"	243,972	413	243
JA7NVF	"	173,048	336	194
JE7SLC	"	120,989	280	187
JF4UBH	"	84,056	230	158
JJ2HSC	"	73,146	216	146
JM1LAW	"	69,384	224	147
JL2AQX	"	67,760	200	140
JHØEPI	"	66,671	212	121
JA1BUN	"	59,595	168	137
JH7KTI	"	57,654	173	142
JA3BBG	"	56,012	168	134
JR2IGV	"	48,195	173	119
JP1SPC	"	46,500	172	125
JH1WEH	"	45,210	165	110
JR8OGB	"	29,593	134	101
JA6QDU	"	28,809	120	97
JE1UFF	"	23,959	123	97
JM1APN	"	19,118	92	79
JF4UMY	"	11,460	89	60
JG4TFC	"	8,910	65	55
JF7WLX	"	8,208	76	57
JR3KAH	"	6,670	59	46
JR4ISK	"	6,120	52	45
JA5EO	"	4,968	50	36
JR1OYL	"	4,797	49	41
JAØBR	"	3,344	76	59
JK1CYF	"	2,490	32	30
JL2RQH	"	1,836	30	27
JO1LDY	"	1,479	34	29
JF7VVL	"	1,300	28	25
JG1BCD	"	828	18	18
JA3FZI	"	680	30	10
JN1MKZ/2	"	615	16	15
JG1OTQ	"	253	11	11
JRØGXA	"	192	14	12
JG7LBN	"	162	10	9
JAØTW	"	48	6	6
JR1ZTT	"	25	5	5
JJ1JHJ	"	6	2	2
JQ1UNI	"	1	1	1
JG4AKL	**14**	**742,000**	**720**	**400**
JA2THS	**14**	**538,535**	**566**	**355**
JH7QXJ	**14**	**482,791**	**585**	**317**
JH1NBN	"	332,415	442	267
JE3ZFS	"	250,494	417	249
			(Op. JK3HZH)	
JA2ADH	"	243,660	382	262
JAØAD	"	47,424	194	96
JA7YCQ	"	25,203	133	93
			(Op. Tsuyoshi)	
JJ1NNJ	"	23,760	117	88
JA1GO	"	8,700	60	58
JA6AQV	"	4,872	50	42
JE1GZB	"	2,511	31	31
JA2BAY	**7**	**601,200**	**557**	**300**
JH7WKQ	**7**	**370,332**	**524**	**243**
JAØUMV	"	246,776	368	218
JA7RXU	"	2,310	37	35
JA8EJO	"	360	11	9

MONGOLIA

JTØNP	**A**	**3,341,803**	**3830**	**499**
			(Op. HA5NP)	
JT1BG	**21**	**385,600**	**1070**	**241**
JT1BQ	"	154,521	560	177

JORDAN

JY9LC	**28**	**363,400**	**714**	**230**
			(Op. W4LCL)	

HONG KONG

VS6UP	**A**	**152,438**	**474**	**169**
			(Op. KB7G)	
VS6CT	**28**	**112,654**	**425**	**158**

INDIA

ATØT	**A**	**3,515,148**	**2949**	**518**
			(Op. K3TW)	
ATØL	**28**	**26,361**	**135**	**87**
			(Op. VU2LBW)	
ATØZ	**21**	**1,556,268**	**1513**	**382**
			(Op. VU2ZAP)	
ATØN	**14**	**57,375**	**178**	**125**
			(Op. VU2NIA)	

UK SOV. BASE AREAS ON CYPRUS

ZC4DS	**A**	**108,896**	**247**	**164**

U.S.S.R.

ASIATIC

UWØLT	**A**	**1,267,656**	**1126**	**442**
UAØSR	**A**	**645,810**	**831**	**330**
UA0UCY	"	29,200	152	100
RWØWR	**21**	**615,984**	**829**	**272**
UAØQF	"	360,998	792	269
UAØSNT	"	113,925	400	228
UAØSME	"	96,760	351	164
UAØTO	**14**	**1,959,100**	**1500**	**550**
UAØABK	"	1,419,400	1115	470
UWØCF	"	555,390	878	330
UWØMF	"	460,215	646	315
RAØSU	"	349,939	555	283
UAØLGK	**7**	**129,564**	**502**	**122**
RAØFA	"	22,862	125	71
UA9MR	**A**	**1,098,390**	**1271**	**410**
UA9XAB	**A**	**474,936**	**640**	**308**
UA9KM	"	376,516	640	238
UW9CY	"	328,640	549	260
UA9YKE	"	273,760	535	232
UW9OQ	"	36,520	150	110
UA9YNC	"	7,448	63	49
RA9UAD	**28**	**83,385**	**271**	**153**
UA9XSJ	"	9,106	88	58
RA9XDO	"	1,696	36	32
UA9WNR	"	555	17	15
UA9AKO	**21**	**688,572**	**793**	**372**
RW9HZ	"	375,480	629	298
RA9CVC	"	302,450	608	263
UA9CVA	"	260,145	495	235
UA9MA	**14**	**2,336,652**	**1547**	**564**
UV9CP	"	1,585,224	1246	492
UA9TX	"	1,341,820	1090	460
UA9XL	"	226,000	400	226
UV9FR	"	188,656	338	208
UA9CSS	**7**	**865,940**	**577**	**290**
UA9OJT	"	261,700	347	175

AZERBAIJAN

UD6DHL	**A**	**35,776**	**115**	**86**

ARMENIA

RG6GBW	**21**	**818,226**	**1026**	**347**

UZBEK

RL7PAV /R[5	**21**	**646**	**20**	**19**
RI8BQ	**14**	**61,250**	**225**	**125**
UI8CAJ	**7**	**253,736**	**299**	**161**

TADZHIK

UJ8JCM	**28**	**472,347**	**951**	**279**

KAZAKH

UL7ACI	**28**	**831,260**	**949**	**356**
UL7OB	"	531,700	1006	260
RL7LCT	"	1,682	50	29
UL7DBD	**21**	**65,526**	**257**	**163**
UL7LC	**14**	**938,960**	**904**	**388**
UL7DA	"	751,086	792	378

KIRGHIZ

UM8MRG	**A**	**179,740**	**317**	**190**
UM8MIG	**28**	**650,025**	**1204**	**321**
RM8MA	**21**	**377,239**	**588**	**283**
UM8MAA	**7**	**30,360**	**102**	**66**

EUROPE

MONACO

3A8F	**A**	**270,108**	**601**	**246**
			(Op. 3A2LF)	
3A/DJ6QT	"	254,657	558	247

PORTUGAL

CT2DIZ	**A**	**266,716**	**543**	**262**
CS5CQK	"	166,025	346	229
			(Op. CT1CQK)	
CQØTM	"	52,224	172	128
			(Op. CT1TM)	
CR6UE	**28**	**137,760**	**304**	**168**
			(Op. CT4UE)	
CT1BBJ	"	30,624	172	88
CQ5BOP	**21**	**2,185,529**	**1750**	**569**
			(Op. CT1BOP)	
CQØCIR	**14**	**417,599**	**667**	**353**
			(Op. CT1CIR)	
CT1DRD	"	129,876	428	237
CT1AOZ	**1.8**	**82,592**	**396**	**116**

AZORES

CU3AC	**A**	**474,640**	**822**	**349**

GERMANY(FRG)

DJ8UV	**A**	**1,217,022**	**943**	**623**
DK1QH	**A**	**847,880**	**858**	**451**
DA2ER	**A**	**836,295**	**843**	**439**
DJØMW	"	179,200	341	280
DK5DS	"	160,446	370	221
DL4OK	"	157,765	303	227
DL9EY	"	36,828	152	93
DL9EDC	"	21,018	158	93
DL7ZR	"	16,920	117	90
DK6BT	"	12,580	75	74
DL /SP5EAQ	"	12,006	84	69
DJ6QO	"	3,135	55	33
DL1GRQ	"	2,700	54	33
DK5KJ	"	2,664	44	36
DL3ME	**28**	**2,538**	**35**	**27**
DLØWPX	**21**	**325,745**	**524**	**287**
			(Op. DL4ZBK)	
DJØBX	"	16,590	112	79
DL /OE5UKL	"	200	10	10
DL2JX	**14**	**90,517**	**286**	**193**
DL8PC	**7**	**783,048**	**744**	**316**
DF8XC	**3.7**	**618,444**	**685**	**369**

SPAIN

EA7DHP	**A**	**1,313,350**	**1273**	**475**
EA7AL	**A**	**521,640**	**639**	**378**
EA3EGB	**A**	**334,941**	**517**	**291**
EA1GT	"	331,200	671	320
EA2BUN	"	292,746	475	291
EA2XX	"	139,230	367	221
EA1CVZ	"	104,275	316	215
EA5CPH	"	103,602	262	186
EA5FYE	"	89,240	235	184
EA5DCL	"	59,625	209	159
EA1AW	"	50,468	153	124
EA5AEN	"	46,222	151	121
EA2CR	"	39,312	189	126
EA7CWA	"	21,994	107	94
EA3EOD	"	5,616	54	52
EA5BK	"	1,035	27	23
ED4EGC	**28**	**49,494**	**157**	**113**
EA1CON	**28**	**28,275**	**112**	**87**
EA3FBO	"	27,544	116	88
EA5FCJ	"	16,800	84	70
EA3ELZ	"	7,480	59	44
EA7DHK	"	6,670	59	46
EA3FRJ	"	6,510	55	42
ED7CA	"	3,441	37	31
EA7AVU	**21**	**137,598**	**324**	**213**
EC3CPT	"	55,380	266	130
EA2CFZ	"	24,541	153	97
EC4CNA	"	9,135	79	63
ED3AAY	**14**	**507,357**	**811**	**387**
EA3DZG	"	45,360	228	140
EA3FKC	"	6,213	59	57
ED3DXD	**7**	**108,528**	**266**	**168**
EA3ELM	**3.7**	**2,112**	**35**	**32**

BALEARIC IS.

EA6WV	**A**	**1,817,856**	**1537**	**526**
EA6VQ	**28**	**36,951**	**129**	**109**

IRELAND

EI7DJ	**A**	**103,530**	**348**	**203**

FRANCE

TW5E	**A**	**3,548,160**	**2085**	**672**
			(Op. F68EE)	
F6DZU	**A**	**982,124**	**912**	**442**
FE6AOJ	"	513,907	630	347
FE6DRP	"	174,492	347	262
F6AWW	"	137,815	420	215
F6BFH	"	117,105	262	211
F1HWB	"	112,110	300	202
F6DLM	"	67,160	190	146
F3VX	"	33,154	151	121
F6ENT	"	15,808	90	76
F3NG	"	1,012	23	23
TW4O	**7**	**964,168**	**1014**	**382**
			(Op. F6ARC)	
F6EZV	"	366,120	557	270
FV8NDX	**3.7**	**264,966**	**581**	**237**
			(Op. F8WE)	
FF1LQU	"	250,746	483	237
			(Op. F5MF)	
F6BVB	**1.8**	**9,360**	**81**	**60**

ENGLAND

GB2FXB	**A**	**3,374,100**	**2083**	**690**
			(Op. G3FXB)	

The top Asian multi-single entry was H22H operated by 5B4MF and 5B4LP.

ZP5Y relaxing after his fine 21 MHz effort.

Bill, WA8YTM, second-place finisher in the 8th district.

GB5AR	**A**	**80,838**	**237**	**162**
			(Op. G4XKR)	
G4KHF	"	35,108	203	131
G4YEK	"	17,952	120	96
G4OBE	"	3,430	32	31
G3XWZ	**1.8**	**3,854**	**70**	**41**

SCOTLAND

GB5CO	**A**	**582,062**	**1008**	**367**
			(Op. G4OBK)	
GM4HRJ	**3.7**	**19,928**	**110**	**94**

WALES

GW0DJX	**28**	**1,976**	**36**	**26**
GW4BLE	**21**	**720,792**	**789**	**376**

HUNGARY

HA0MM	**A**	**2,267,062**	**1625**	**581**
HA0NNN	**A**	**921,200**	**1026**	**400**
HA8XX	"	750,508	906	407
HA0HW	"	640,644	880	394
HA5PP	"	568,854	794	338
HA7UI	"	547,304	782	344
HA6NL	"	79,659	280	159
HA4YO	"	61,040	205	140
HA4XG	"	26,754	134	98
HA5JI	**28**	**198,662**	**383**	**218**
HG5IQ	"	65,408	191	128
HA4KYN	"	39,780	149	102
			(Op. Jozsef)	
HA8CO	**14**	**7,740**	**86**	**60**
HA9RE	**7**	**1,078,640**	**1051**	**388**
HA1XR	**3.7**	**471,540**	**759**	**290**
HA6PX	"	371,734	674	277

SWITZERLAND

HB9CXZ	**A**	**638,337**	**743**	**339**
HB9AAA	**A**	**151,354**	**302**	**266**
HB9AON	"	69,027	196	123
HB9DDO	"	39,130	160	130

ITALY

I3BQC/IL7	**A**	**498,330**	**800**	**339**
IK2AEQ	**A**	**222,264**	**405**	**252**
IK4GNK	"	82,110	278	170
IO8IYW	"	60,480	166	140
I4CSP	"	57,232	239	146
IK2ANI	"	43,560	151	120
IK4FNF	"	10,872	73	72
IK2LCY	"	10,416	80	62
I8BYG	**28**	**135,548**	**283**	**206**
IK8DWN	**28**	**88,894**	**263**	**169**
IK2BHX	"	46,345	170	115
IV3BMV	"	9,506	68	49
I6YEF	"	2,910	33	30
IK2GSN	**21**	**605,931**	**714**	**327**
IN3ASW	"	124,740	281	198
IK3HMD	"	58,374	217	138
IK0EIE	"	17,415	85	81
IO2UIY	**14**	**1,554,124**	**1315**	**572**
IK8ETA	**14**	**1,308,866**	**1305**	**544**
IN3XUG	"	34,695	149	135
IO5MXX	**3.7**	**891,330**	**962**	**365**

SARDINIA

IS0LLJ	**A**	**21,715**	**115**	**101**

NORWAY

LH2A	**A**	**24,089**	**148**	**109**
			(Op. LA2AD)	
LA9VDA	"	9,272	86	76
LA3WBA	"	4,410	60	45
LA1EE	**21**	**572,880**	**616**	**385**
LA3YEA	**14**	**66,526**	**567**	**62**

LUXEMBOURG

LX2QR	**14**	**94,062**	**302**	**183**

BULGARIA

LZ2KSQ	**A**	**2,087,928**	**1539**	**564**
			(Op. LZ1F156)	
LZ1HP	"	188,730	403	270
LZ1BJ	"	69,600	212	145
LZ1QI	**28**	**10,404**	**70**	**51**
LZ1GO	"	75	7	5
LZ2WM	**21**	**92,988**	**232**	**162**
LZ1LW	**14**	**9,200**	**100**	**92**
LZ1KKZ	**3.7**	**214,076**	**451**	**218**
			(Op. Ivanov)	
LZ2CW	**1.8**	**2,640**	**40**	**33**

FINLAND

OH6EI	**A**	**2,380,293**	**1707**	**621**
OH1AF	**A**	**2,004,504**	**1316**	**578**
			(Op. OH1EH)	
OH4RH	**A**	**639,324**	**739**	**354**
OH1BV	"	361,501	579	301
OH6NEV	"	345,576	642	308
OH6NIO	"	232,200	481	270
OH9KK/2	"	107,740	340	184
OH6SU	"	75,348	226	161
OH7NW	"	67,452	236	154
OH2BSS/7	"	42,834	160	121
OH5VL	"	12,672	76	72
OH3AT	"	2,380	38	35
OH1HS	"	2,010	34	30
OH7EU	**28**	**45,430**	**164**	**118**
OH6NTO	**28**	**41,912**	**143**	**104**
OH7NDX	"	7,708	66	47
OH7JL	"	7,439	64	43
OH5OD	"	1,725	26	23
OH2BXT	"	75	5	5
OH5BM	**21**	**1,249,680**	**1277**	**381**
OH5RZ	"	21,204	103	76
OH3OJ	**14**	**272,160**	**534**	**280**
OH6NJM	"	30,821	200	119
OH9NUE	"	22,880	160	110
OH2HE	**7**	**399,454**	**591**	**271**
OH3UU	"	248,082	412	237
OH6AC	**3.7**	**84,466**	**277**	**157**
			(Op. OH6CS)	
OH2BYS	"	18,306	109	81
OH3AC	**1.8**	**200**	**12**	**10**

CZECHOSLOVAKIA

OK1RI	**A**	**3,120,480**	**1842**	**660**
OK3RM	**A**	**2,544,306**	**1714**	**618**
OK2RU	**A**	**609,984**	**732**	**353**
OK3YCA	"	189,666	360	246
OK3PQ	"	154,036	331	194
OK2BBI	"	148,599	315	209
OK3YK	"	147,615	401	195
OK3CTX	"	144,693	384	207
OK3KGX	"	120,120	360	182
			(Op. OK3TBK)	
OK2SPJ	"	119,040	294	186
OK3CDZ	"	113,040	322	180
OK3CGT	"	105,842	260	187
OK1DXW	"	89,270	300	158
OK2PGT	"	67,570	253	145
OK2OVZ	"	45,900	182	135
OK3FON	"	24,752	105	91
OK3TEW	"	21,672	118	86
OK1MHI	"	15,440	105	80
OK1JDJ	"	1,134	30	27
OK3YX	**28**	**262,185**	**450**	**231**
OK2QX	"	9,204	65	52
OK1JCH	"	8,131	59	47
OK3CLD	"	4,758	50	39
OK2ABU	"	1,496	26	22
OK2BHM	"	468	13	13
OK3LZ	**21**	**720,896**	**788**	**352**
OK1AJN	"	207,024	409	227
OK1PFJ	**14**	**82,170**	**248**	**166**
OK2BQL	**14**	**64,350**	**222**	**150**
OK2PKS	"	28,994	154	109
OK1DVK	"	21,888	114	114
OK3CQG	"	13,926	137	66
OK1MSP	"	9,960	71	60
OK2HI	**3.7**	**126,636**	**340**	**183**
OK3YCL	"	95,418	281	171
OK1AYE	"	22,968	132	87
OK2KBM	"	13,632	102	69
			(Op. OK2BVG)	
OK3CWQ	**1.8**	**49,476**	**210**	**114**

BELGIUM

ON4XG	**A**	**165,354**	**356**	**217**
ON5CZ	"	16,095	131	87
OR8TT	**14**	**971,003**	**1135**	**451**
			(Op. ON7TK)	

DENMARK

OZ1DPW	**A**	**246,881**	**407**	**271**
OZ1CLQ	**A**	**216,468**	**427**	**252**
OZ1LTB	"	110,229	301	181
OZ6PI	"	90,138	272	166
OZ1DYI	"	69,222	227	166
OZ5PZ	"	47,478	241	123
OZ8IE	"	42,880	207	128
OZ1EMY	"	30,411	125	109
OZ1ASP	"	28,000	144	100
OZ8T	"	3,395	40	35
OZ1LRT	**14**	**51,830**	**195**	**142**
OZ1INN	"	18,746	131	91

THE NETHERLANDS

PA0ZH	**A**	**791,520**	**874**	**408**
PI1GOE	**A**	**52,582**	**200**	**142**
			(Op. PA3EOB)	
PA3ESZ	"	21,252	118	92
PA2BJM	"	4,884	44	37
PA3DMH	"	3,688	40	36
PA3CAH	"	2,380	37	35
PA0YN	"	1,792	35	32
PA2REH	**21**	**106,908**	**271**	**177**
PA3CLS	"	954	21	18
PA3DQQ	**14**	**1,891**	**43**	**31**
PA0IJM	**3.7**	**236,848**	**508**	**226**
PA2SWL	"	136,756	344	191

SWEDEN

SM4CMG	**A**	**232,918**	**400**	**254**
SK0LM	**A**	**155,078**	**407**	**209**
			(Op. SM0DRD)	
SM5CSS	"	93,912	250	182
SM3CER	"	53,000	198	125
SM6LIF	"	37,067	133	101
SM0JOQ	"	35,420	138	115
SM0BDS	"	34,632	146	117
SM7HSP	"	9,504	87	66
SM0HTO	**28**	**44,080**	**141**	**116**
SM4RRF	"	2,430	36	27
SM0NZB	"	816	21	17
SM2LWU	**21**	**45,568**	**158**	**128**
SM5GMG	**14**	**567,182**	**704**	**406**
SL4ZXE	**14**	**562,698**	**1025**	**387**
			(Op. SM0OGQ)	
SM7TV	"	37,674	189	117
SM3LIV	"	14,742	129	91
SM5ARR	**7**	**222,725**	**105**	**87**

POLAND

SP6CZ/6	**A**	**244,000**	**471**	**244**
SP9HWN	**A**	**142,882**	**306**	**199**
SP9DWT	"	141,561	287	189
SP9AGS	"	81,788	303	161
SP9AKD	"	66,285	220	135
SP9BLF	"	59,362	224	134
SP3HDU	"	55,062	216	138
SP9MRM	"	46,494	205	123
SP6AUI	"	36,738	160	117
SP3BVI	"	19,780	103	86
SP3SZ	"	13,690	112	74
SP9ZE	"	3,627	53	39
SP6OJJ	**28**	**3,990**	**42**	**35**
SP5ES	"	2,700	32	27
SP9AIM	"	1,387	25	19
SP3IBS	"	40	4	4
SP6DVP	**21**	**53,410**	**195**	**109**
SP2FAP	"	24,948	101	84
SP9DEM	"	13,108	88	58
SP6BFK	"	2,108	24	20
SP3LPR	"	525	15	15
SP9RTT	**14**	**120,384**	**317**	**198**
SP5EMM	**14**	**97,470**	**262**	**190**
SP8FIV	"	29,120	128	104
SP9AVZ	"	21,805	151	89
SP9IWO	"	17,513	93	83
SP1EOI	"	12,312	83	66
SP8HXN	"	10,266	90	58
SP3JHY	"	9,234	73	54
SP9MRO	"	8,555	65	59
SP6NIG	"	4,738	51	46
SP6DHH	"	3,570	80	42
SP9BRP	"	1,144	34	26
SP8TQ	"	80	8	8
SP6GF	**7**	**178,752**	**405**	**196**
SP9CTW	**7**	**164,580**	**309**	**211**
SP6CDK	"	92,235	270	165
SP6AGD	"	80,850	238	147
SP6OJK	**3.7**	**46,706**	**197**	**121**
SP8LZG	"	41,968	177	122
SP9MDY	"	714	22	17

GREECE

SX0GC	**A**	**125,200**	**450**	**200**
			(Op. SV0GC)	

RHODES

J45JG	**A**	**2,309,034**	**2364**	**546**
			(Op. SV1JG)	

GERMANY(GDR)

Y22JJ	**A**	**570,495**	**721**	**365**
Y58WA	**A**	**383,318**	**608**	**299**
Y56YF	**A**	**358,284**	**559**	**292**
Y54NL	"	348,245	555	289
Y57OG	"	322,025	665	275
Y48PJ	"	259,318	528	263
Y33UJ	"	240,318	494	237
Y32QD	"	235,620	467	255
Y45RN	"	217,464	442	246
Y47PN	"	204,073	476	227
Y24AM/A	"	164,640	356	224
Y28AN/P	"	150,423	404	203
Y61ZA	"	119,130	320	190
Y31LA	"	115,478	360	181
Y31EM	"	96,162	288	186
Y25KA	"	94,956	305	164
Y23RJ/P	"	86,625	312	165
Y46PH	"	83,844	427	102
Y32KI	"	69,611	267	151
Y38YK	"	69,003	234	153
Y41SN	"	63,072	225	146
Y41YM	"	62,181	192	141
Y44QN	"	52,000	199	130
Y86TL	"	48,372	197	139
Y21HB	"	43,173	177	117
Y67UL	"	35,795	364	194
Y72YN	"	33,866	154	118
Y78SL	"	33,222	121	113
Y35RB	"	32,775	150	120
Y43XE	"	31,622	131	97
Y56NM	"	29,376	120	102
Y66YF	"	24,000	124	100
Y47JN	"	22,532	120	86
Y44TN	"	21,824	115	88
Y51XO	"	20,904	111	78
Y58ZG	"	19,764	200	54
Y21HI/A	"	15,330	104	73
Y24SK/A	"	13,875	92	75
Y59ZF	"	9,639	81	63
Y58UA	"	8,965	60	55
Y63SI	"	8,550	64	45
Y26KO	"	8,003	62	53
Y32VK	"	7,200	74	60
Y55TJ	"	7,056	52	42
Y56MM	"	7,007	63	49
Y23CM	"	6,750	56	54
Y22BF	"	5,136	59	48
Y22XF/A	"	4,524	40	39
Y25DA	"	3,772	41	41
Y44WA	"	2,701	40	37
Y32JK	"	1,485	33	27
Y39UL	"	1,106	54	40
Y24GB/A	"	1,100	23	20
Y32WN	"	1,034	30	22
Y51TG	"	1,020	23	20
Y34OL	"	1,012	24	23
Y24FB/A	"	578	17	17
Y25IJ	"	570	15	15
Y26LG	"	102	8	6
Y33VL	**28**	**12,118**	**167**	**73**
Y39ZC				
/Y39RE	"	429	13	11
Y37ZE	**21**	**46,592**	**166**	**112**
Y23LG	"	24,964	137	79
Y22WF	"	13,601	203	67
Y46ZC	"	2,340	40	26
Y21UL	"	2,175	33	25
Y22EX	**14**	**178,334**	**352**	**247**
Y48YN	**14**	**73,313**	**221**	**167**
Y21FC	"	21,565	119	95
Y28GO/A	"	16,212	112	84
Y22BK	"	13,038	99	82
Y23ZL	"	5,024	100	32
Y26DM	"	4,272	61	48
Y33VC	"	1,488	26	24
Y28AL	**7**	**106,080**	**287**	**170**
Y27AO	"	13,020	90	70
Y35ZJ	**3.7**	**100,828**	**284**	**182**
Y48VH	"	2,108	42	31
Y23KF	**1.8**	**2,418**	**42**	**31**

ROMANIA

YO6KEI	**A**	**476,064**	**650**	**288**
YO2ARV	**A**	**87,164**	**277**	**154**
YO2BB	"	59,318	179	133
YO9DHZ	"	46,116	170	126
YO4BQV	"	37,268	160	121
YO9FEH	"	36,296	156	104
YO2BP	"	29,393	130	91
YO9IAB	"	21,156	131	82
YO9AHX	"	18,330	130	94
YO6DDF	"	17,577	91	81
YO3DCO	"	10,647	65	63
YO3AC	"	4,536	44	42
YO3JF	**21**	**186,921**	**368**	**207**
YO6CRP	**14**	**17,730**	**120**	**90**
YO9CSM	"	2,592	64	36
YO5CYH	**7**	**78,792**	**226**	**147**
YO4CVT	"	63,666	201	131
YO5QCA	"	20,640	107	86
YO6BKG	**3.7**	**119,000**	**354**	**175**
YO5QAW	"	48,906	206	117
YO6AJI	**1.8**	**8,466**	**80**	**51**

YUGOSLAVIA

YT3M	**A**	**1,546,662**	**1244**	**474**
			(Op. YU3ZO)	
YU3XU	**A**	**124,530**	**294**	**210**
YU7MF	"	58,608	171	132
YU1RA	"	16,107	68	59
YU7BW	**28**	**255,205**	**453**	**215**
YU7GW	**28**	**132,475**	**285**	**175**
YU1LM	"	48,952	161	116
YU2HCD	"	43,206	154	114
			(Op. YU2LH)	
YU1HA	"	15,525	87	68
4N4A	**21**	**2,716,816**	**1755**	**613**
			(Op. YU4EU)	
YT3AA	**21**	**2,352,504**	**1663**	**532**
YU7AV	"	1,457,895	1283	415

Say You Saw It In CQ

Application Form
Yaesu Advisory Council

A photocopy of this form is OK.

The envelope containing this form must be postmarked no later than April 7, 1989.

Name	Call Sign	License Class	Licensed Since

Street Address	City, State, Zip	Age

Phone Number with Area Code	Typical # of operating hours per month

I usually operate the following bands, using the radios indicated:

Band	Yaesu	Kenwood	Icom	Other
160 meters				
80 meters				
40 meters				
30 meters				
20 meters				
15 meters				
12 meters				
10 meters				
6 meters				
2 meters				
220 MHz				
440 MHz				
1.2 GHz				

Rules for entry.

Applicant must be licensed for at least one year, and must be active on at least one ham band.

No more than one application per person will be accepted.

Applicant must be available to come to Southern California at Yaesu's expense on June 13 or 14, 1989, and depart on June 18.

Applicant must be willing to sign a nondisclosure agreement.

Applicant must be available, from time to time, to discuss, on the telephone, product features with Yaesu's marketing staff.

Applicant must be willing to have his or her photo appear in an advertisement.

No person associated with Yaesu USA, its dealers or distributors, its advertising agencies, or employees is eligible to apply. In addition, no person who has any business interest of any kind with amateur radio or commercial radio may apply.

Why do you feel that you should be selected to serve on the Yaesu Advisory Council?

Mail to: Yaesu Council, Yaesu USA, 17210 Edwards Road, Cerritos, CA 90701

In June 1989, Yaesu invites 11 amateurs to change the course of amateur radio.

And you may be one of them!

Meeting with ten other amateurs (one from each call district and one chosen at Dayton Hamvention '89) and Yaesu's top staff for a special three-day "design summit."

Where you'll share your thoughts, ideas and experiences of amateur radio. And help us determine what operators want most from Yaesu equipment.

If chosen, you'll be flown to Anaheim, California. Put up at the Disneyland Hotel. And given a tour of Jet Propulsion Laboratory and a pass to Disneyland.

All compliments of Yaesu.

So if you have great ideas about amateur radio—whatever your license class—fill in and mail the entry form on the reverse side today. (That alone ensures you a discount coupon towards your next Yaesu purchase!)

Yaesu's 1989 Design Team. Your chance to *really* get your ideas heard.

YAESU

To enter, fill out form on reverse side.

YU3EF	"	531,789	654	309
YU3EQ	"	245,100	417	228
YU7FT	"	61,776	211	143
YU1KQ	**14**	**1,744,618**	**1584**	**589**
YU4XA	"	11,859	69	67
4N4L	**7**	**732,828**	**818**	**346**
			(Op. YU4ELS)	
YT7A	"	728,850	857	339
			(Op. Edy)	
4N1A	**3.7**	**475,376**	**608**	**292**
			(Op. YU1EA)	

U.S.S.R.
EUROPEAN

UA4ANO	**A**	**1,006,416**	**1207**	**522**
RA1AA	**A**	**555,220**	**838**	**355**
UA4HBM	**A**	**307,839**	**552**	**321**
UA6BPJ	"	273,166	492	221
UV3DN	"	263,407	582	293
RA1AG	"	252,354	510	274
UA3ATV	"	208,017	400	261
RW3AH	"	189,441	405	217
UA4NCI	"	189,288	329	264
UA3ZU	"	187,956	431	227
UA4WEM	"	176,600	350	188
UW6LC	"	162,410	355	218
RA3VA	"	156,600	390	225
RZ3DZ	"	131,252	319	209
UA4NC	"	112,796	284	173
UA3TN	"	64,386	185	147
UW6LL	"	62,205	256	165
UA3TS	"	49,780	190	131
UA4ANZ	"	43,680	165	112
RV6AF	"	38,280	150	120
UA3PB	"	14,839	91	71
UA4AO	"	8,357	73	61
UA6ADC	**28**	**256,113**	**475**	**199**
UW6MA	"	103,818	262	143
UA6BPM	"	23,760	115	80
UA6XT	"	140	10	7
UA6LTV	**21**	**1,148,664**	**1177**	**456**
RA6LBR	**21**	**1,029,800**	**1173**	**450**
UA4WI	"	736,208	1002	356
RW6AH	"	296,637	681	303
RA4CC	"	281,580	517	285
RA3QQC	"	111,197	330	211
UA4CIW	"	99,614	273	198
RA3DJA	"	86,655	232	159
UA3DNR	"	79,180	227	148
UA3ZIJ	"	76,752	233	164
RV6AA	"	76,386	292	174
UA4CKC	"	56,887	259	163
UA1QAM	"	22,000	114	88
UA4NBD	"	13,224	95	76
UA3ZFT	"	2,040	32	24
UW1CX	**14**	**1,386,684**	**1520**	**556**
UA3PP	**14**	**236,736**	**590**	**288**
UA3LDZ	"	92,530	297	190
UA1ANA	"	82,130	279	191
UA3ST	"	30,208	147	118
UA1QBV	"	13,020	113	93
UA6LQ	**7**	**704,512**	**843**	**344**
UA3XBB	"	41,600	169	104
UA4CCC	**1.8**	**7,900**	**88**	**50**
UW6LO	"	1,152	46	16
UA3YBJ	"	390	13	13

FRANZ JOSEF LAND

UA1OT	**21**	**21,049**	**143**	**97**

KALININGRADSK

UZ2FWK	**A**	**32,368**	**218**	**136**
			(Op. Jack)	

UKRAINE

RB4IRO	**A**	**1,274,170**	**1233**	**470**
UT4UX	**A**	**927,017**	**970**	**427**
UY5TE	"	261,072	549	252
UB7QA	"	259,494	600	183
UB4MF	"	247,857	384	199
RB5CL	"	196,320	430	240
RB5IQ	"	192,942	430	243
UB5QMA	"	165,968	356	184
RB5EX	"	150,699	336	191
UB5MLP	"	150,322	333	223
UT5RY	"	129,816	561	216
U1BA	"	124,806	351	186
RB5CCO	"	93,555	253	165
UY5YY	"	86,900	207	158
UT4UZ	"	84,420	225	140
UB5MQF	"	78,400	226	196
UB5AFI	"	52,910	164	130
UB5CDX	"	52,514	172	121
UB5EQB	"	45,260	187	105
UB5LRS	"	36,540	137	105
UB5TCJ	"	24,057	115	99
UB0QZ	"	7,645	74	55
UY5VA	"	4,180	47	38
UB5CDF	**28**	**65,919**	**511**	**129**
RB5QLJ	"	15,424	88	64
UT5UCM	"	18	3	3
UB5IJG	**21**	**1,344,623**	**1265**	**427**
RB5LQ	"	147,763	343	219
RB5TK	"	38,788	130	86
UB5FHU	"	37,948	139	106
UY5ZM	**14**	**856,623**	**1346**	**453**
RB5DX	**14**	**834,176**	**1047**	**448**
RB5LL	"	552,483	1027	391
UB5IAL	"	521,136	926	396
RB5EG/A	"	184,860	480	260
RT5UO	"	14,697	157	69
RB5QP	"	663	39	17
UT4UO	**7**	**399,208**	**622**	**278**
RB5SA	**7**	**213,675**	**363**	**185**
RB5WO	"	142,486	351	191
RB5IV	"	18,296	86	63
UB5WCV	"	9,130	69	55
UB5IKB	**3.7**	**254,232**	**500**	**214**
UB5TCN	"	85,260	309	147
RB5UI	**1.8**	**19,460**	**136**	**70**
RB5IOV	**1.8**	**7,296**	**75**	**57**
UB5YFZ	"	4,284	62	42
UB5EQG	"	1,798	40	29
UB4LKD	"	390	21	13
			(Op. Boris)	

BYELORUSSIA

UC2OM	**A**	**504,455**	**724**	**355**
UC2WO	**28**	**645**	**15**	**15**
UC2WCH	"	341	11	11
UC2AAD	**21**	**84,227**	**227**	**143**
UC2OE	**14**	**684,999**	**1007**	**393**
UC2IDC	**7**	**117,882**	**301**	**177**

MOLDAVIA

UO5ODA	**A**	**111,340**	**283**	**190**
RO4OA	**14**	**494,453**	**805**	**383**
UO5OQ	**3.7**	**485,568**	**755**	**288**

LITHUANIA

UP2CY	**A**	**903,792**	**989**	**428**
UP3BH	**A**	**884,425**	**912**	**425**
UP2BSP	"	386,375	573	281
UP2BR	"	383,380	565	290
UP3BU	"	280,395	525	279
UP3BA	"	164,076	429	242
UP2SA	"	132,430	324	190
UP2ND	"	65,475	216	135
UP2BQQ	"	47,946	182	122
UP2BBD	"	18,415	131	67
UP3BQ	"	14,208	103	74
UP2OQ	"	1,080	21	20
UP2BLF	**28**	**7,339**	**61**	**41**
UP2OU	"	4,699	42	37
UP2BGB	"	1,679	25	23
UP2BN	**21**	**264,073**	**484**	**199**
UP2AV	"	51,992	183	112
UP2PCK	**14**	**24,192**	**141**	**108**
U2PP	**7**	**67,056**	**229**	**132**
UP2NK		49,784	173	127
UP2BHA	"	17,820	115	81
UP2BPO	"	13,632	85	71
RP2BKB	**1.8**	**3,920**	**61**	**35**

LATVIA

UQ2GN	**A**	**329,184**	**649**	**254**
UQ2GIP	"	8,296	70	61
UQ2GCP	**21**	**16,992**	**90**	**72**
UQ2GKL	**14**	**648,296**	**855**	**424**
UQ2LL	**7**	**29,003**	**130**	**97**
UQ2GGE	**3.7**	**23,584**	**128**	**88**

ESTONIA

UR2QD	**A**	**830,737**	**1100**	**437**
UR2RNG	"	181,332	425	219
UR2LZ	"	1,881	34	33
UR2RC	**28**	**5,658**	**49**	**46**
RR2RN	**21**	**45,962**	**164**	**98**
RR2RO	"	43,656	156	107
UR2RE	**14**	**521,208**	**808**	**381**
UR2RER	**3.7**	**55,552**	**208**	**128**

OCEANIA
THE PHILIPPINES

K4YT/4D	**A**	**4,311,770**	**2329**	**541**
K1BAZ /DV1	"	1,612,978	1739	307
DU3BAA	**28**	**734,604**	**1136**	**221**
DU3AAL	"	670,350	954	246
DU1NH	**21**	**1,087,852**	**1308**	**283**

FR. POLYNESIA

FO5IW	**14**	**25,110**	**146**	**62**

GUAM

JL1BLW /KH2	**A**	**3,451,990**	**3581**	**305**
JA2NOG /NH2	"	826	18	14
N7DF/WH2	**14**	**3,156,090**	**1969**	**565**
NY6M/KH2	"	2,065,766	1414	514
KH2F	**7**	**751,688**	**612**	**217**

HAWAII

N7NR/NH6	**A**	**5,818,692**	**2952**	**561**
KH6VP	**28**	**270,066**	**468**	**206**
AH6AZ	**3.7**	**492,030**	**401**	**213**

WEST KIRIBATI

T30MA	**A**	**125,544**	**330**	**128**
			(Op. KV4AM)	

AUSTRALIA

VK2KL	**A**	**4,300,160**	**2145**	**640**
AX2APK	"	937,266	811	363
AX2DVU	"	241,920	387	216
VK4KW0	**21**	**179,994**	**477**	**131**

INDONESIA

YB0DPZ	**A**	**3,920,336**	**2167**	**568**
YB3ASQ	**A**	**1,920,932**	**1487**	**442**
YC8RFF	"	653,170	730	307
YC0USJ	"	156,746	282	181
YC0EAQ	**28**	**1,491,815**	**1335**	**389**
YC9VGJ	**21**	**1,144,066**	**1221**	**322**
YC0RBG	**21**	**569,618**	**602**	**322**
YC3OSE	"	217,152	479	234
YC7DF	"	140,060	264	188
YB7BC	"	27,262	113	86
YC2OK	"	21,165	98	82
YC2BKJ	"	12,580	75	68
YC3HCM	"	3,492	39	36

NEW ZEALAND

ZL1AAS	**A**	**1,787,695**	**1294**	**455**
ZL3AAX	"	1,298,652	1200	372
ZL1IM	"	243,600	412	200

SOUTH AMERICA
CHILE

CE2BMU	A	308	11	11
CE3DNP	**28**	**3,642,980**	**2118**	**571**
CE2NJ	"	10,044	67	54
CE6DFY	**21**	**1,180,655**	**942**	**427**
CE3ZI	"	1,058,352	919	408
CE6EZ	**14**	**4,908,060**	**2276**	**732**
CE4FXY	"	4,397,531	2029	667
CE6NOT	**7**	**29,133**	**103**	**83**

BOLIVIA

CP1BA	**28**	**32,256**	**131**	**96**

URUGUAY

CX2AAL	**28**	**3,339,618**	**1914**	**597**
CX8CG	**14**	**328,510**	**429**	**266**

ECUADOR

HC1OT	**A**	**7,237,269**	**3047**	**711**

COLOMBIA

HK1LDG	**A**	**5,494,320**	**3146**	**585**
HK6IKV	**28**	**202,938**	**850**	**227**
HJ3NTI	**7**	**67,824**	**121**	**108**
HK3JJH	**3.7**	**68,340**	**120**	**102**

ARGENTINA

LU3F	**A**	**1,899,168**	**1219**	**542**
			(Op. LU6FAZ)	
LU1LDS	**28**	**2,670,437**	**1632**	**553**
LS6E	"	893,192	860	359
			(Op. LU6EJP)	
LU1JCX	**21**	**1,242,920**	**929**	**460**
LU1F	**14**	**1,111,432**	**871**	**446**
			(Op. LU1FLY)	
LS8E	"	949,520	797	415
			(Op. LU8ESU)	

ARUBA

P40V	**A**	**12,324,780**	**4484**	**828**
			(Op. AI6V)	

NETHERLANDS ANTILLES

PJ2/W1BIH	**A**	**20,475**	**91**	**75**

BRAZIL

PP2ZDD	**A**	**2,933,809**	**1652**	**589**
ZY1LI	**A**	**628,004**	**650**	**338**
			(Op. PY1LI)	
PT7VB	"	167,240	353	226
PY2APQ	"	74,970	184	147
PY3HLM	"	50,320	159	136
PT9ZZ	"	240	12	10
			(Op. PY5ZC)	
PY6KW	"	144	12	9
ZY5EG	**28**	**7,372,512**	**3402**	**736**
			(Op. PY5EG)	
ZY4OY	"	1,920,310	1356	490
ZY5CC	**21**	**8,120,202**	**3156**	**789**
			(Op. PY5CC)	
ZZ5EG	**14**	**8,219,627**	**3215**	**871**
			(Op. PY5ZBA)	
PY5YL	"	1,508,265	1057	495
ZY4BA	"	188,748	300	214

VENEZUELA

YV7QP	**A**	**30,363**	**116**	**87**
YV5LAS	"	29,294	115	97
YY1C	**28**	**1,341,756**	**1262**	**366**
			(Op. YV1CP)	
YV5IZE	"	11,407	82	61
4M5T	**21**	**1,127,784**	**943**	**411**
			(Op. YV5JBI)	
YW1A	**14**	**5,542,754**	**2467**	**757**
			(Op. YV1AVO)	
YW5A	**14**	**3,856,071**	**2022**	**643**
			(Op. YV5AMH)	
4M3B	"	1,027,900	1088	475
			(Op. YV3BKC)	
YW5M	"	102,180	222	156
			(Op. YV5VN)	

PARAGUAY

ZP5MSC	**A**	**198,792**	**404**	**198**
ZP5Y	**21**	**8,939,514**	**3595**	**842**
			(Op. ZP5JCY)	

MULTI-OPERATOR
SINGLE TRANSMITTER
UNITED STATES

WC4E	**5,987,583**	**2937**	**941**
KI6P	**5,751,599**	**2887**	**841**
N4WW	5,416,800	2670	925
KA5W	**4,142,190**	**2457**	**817**
N3BB/5	3,419,577	2313	777
KI1G	**2,941,367**	**1789**	**737**
WC6H	2,288,338	1792	622
NE8T	**2,247,553**	**1843**	**707**
N7TT	**1,577,600**	**1541**	**580**
NZ5I	1,246,225	1758	631
KS3F	**1,165,900**	**1153**	**524**
NW0F	**753,685**	**1141**	**491**
K0LIR	674,432	1027	479
KQ3V	573,750	797	425
KD8B	518,837	837	467
NV4G	416,208	713	368
ND3A	275,984	542	367
NG0X	51,884	337	218
N6VR	18,408	131	104

NORTH AMERICA

FM5CL	**10,971,504**	**4039**	**872**
FJ0A	**7,056,480**	**3061**	**723**
TD9G	**5,288,764**	**3641**	**689**
XO5FX	**3,384,000**	**2710**	**576**
YS0YS	**2,606,617**	**2142**	**559**
VE5QST	2,480,758	2067	553
VE1IDX	**1,795,982**	**1319**	**523**
4C2C	**1,030,976**	**1057**	**356**
VE6WP	**812,760**	**997**	**390**
VE6SF	699,896	870	356
XE1JME	396,204	674	274
KL7CQ	**381,128**	**534**	**284**
VE3VOW	**180,297**	**330**	**207**

AFRICA

5H1HK	**7,369,926**	**3579**	**654**

ASIA

H22H	**10,913,771**	**5201**	**661**
4Z4YU	**5,252,431**	**2982**	**577**
YM2KC	**4,505,527**	**2357**	**551**
JA7YFJ	**3,428,992**	**2260**	**602**
JE2YRD	2,571,315	1633	565
JA7YAA	1,860,600	1379	525
BT4YL	**1,724,996**	**3052**	**364**
JA8YBY	1,016,390	945	410
JA4YJA	702,844	889	332
HL9OB	**611,217**	**808**	**339**
JA1YJR	243,019	420	233
BY1CKJ	228,780	928	186
JT1KAI	**197,718**	**714**	**186**
BY4ALC	153,612	821	153
JA3YQD	55,902	187	121
JA2YEC	39,728	175	104
JA2YEF	20,020	98	77
JA7YYL	16,280	99	74
JA3YDH	140	8	7

EUROPE

LZ9A	**8,708,610**	**3687**	**877**
HG7B	**6,900,080**	**3307**	**880**
TW6A	**6,670,165**	**3524**	**761**
HG5A	6,659,634	3306	831
HG6N	6,061,576	3169	764
HG9R	5,275,686	3249	717
IK4IEE	**5,118,379**	**2504**	**721**
Y38I	**3,456,800**	**2161**	**725**
OK6DX	**3,271,021**	**1949**	**697**
GB4CDX	**3,261,440**	**2156**	**640**
OH7AB	**3,227,484**	**2088**	**663**
HG1S	3,204,796	2447	581
YT3T	**2,870,972**	**1852**	**676**
HG8Q	2,757,348	2128	594
I2EOW	2,691,008	1775	608
ED1DX	**2,670,105**	**2241**	**629**
YU3AI	2,451,680	1746	616
ED3MM	2,450,878	1938	601
OH1AD	2,423,435	1707	595
HA5KKC	2,167,542	1749	531
ED3QD	2,161,142	1735	578
HG6V	2,103,304	1690	568
4N2Y	1,744,532	1257	692
GB5HC	1,643,224	1442	526
PA3CEF	**1,441,158**	**1505**	**426**
YZ2S	1,440,216	1365	498
DK2XX	**1,373,152**	**1209**	**517**
DK0IN	1,342,110	1234	498
SP5PBE	**1,182,708**	**1182**	**423**
LZ1KVZ	1,129,756	1257	416
LA4O	**1,080,974**	**1218**	**454**
IS0QDU	**946,500**	**1313**	**375**
PA0KHS	921,120	1047	404
ON6AH	**902,224**	**1026**	**428**
GB8AU	877,734	1069	403
DK0HR	860,720	1021	424
SP9PEY	824,703	993	373
YZ4J	777,114	1241	369
YT4D	694,203	851	361
EA7GTG	693,956	950	397
GD4UFB	**574,500**	**1130**	**300**
LA1H	534,192	832	372
OK2KLI	498,000	739	332
DL0LI	483,405	680	335
SK2AT	**461,250**	**927**	**369**
OH3AC/4	325,458	483	294
SP1PBW	311,895	557	261
GB8PX	270,336	603	264
4N4K	209,531	461	265
HA6KNX	205,680	429	240
GB4PRS	161,109	562	221
OK1ONI/P	158,646	422	193
GB6SC	143,262	330	189
4N4D	129,232	314	197
SP9PRO	121,824	308	188
HA5KFZ	109,825	309	191
OK2KOD	59,655	192	123
OK1KSZ	42,315	196	105
OK2KVI	32,214	166	118
OK2KPS	30,294	156	99
HA5KDB	19,320	111	84
SP7PGK	11,985	117	85
SP6PAX	10,325	107	59
Y74CG	9,089	80	61
Y57CA	6,360	68	53
OK3KUN	4,264	64	41

OCEANIA

YE4X	**7,910,724**	**3986**	**642**
DX1A	**5,298,310**	**3243**	**470**
KX6DC	**4,288,074**	**2535**	**579**
YB0AQL	2,743,704	2021	477
DX1CW	2,486,306	2114	398
DX9HT	2,036,815	1927	319
VK1GB	**1,311,810**	**1052**	**438**

SOUTH AMERICA

TX8A	**16,530,415**	**5422**	**979**
LR1V	**8,500,972**	**3471**	**809**
HD2A	**8,170,932**	**3272**	**814**
XR4TA	**5,940,000**	**2829**	**720**
AY6D	5,195,520	2499	720
LU4GF	1,616,142	1419	521

U.S.S.R.
CLUB STATIONS
ASIA

RL8PYL	**7,859,329**	**3827**	**776**
UL8LYA	7,138,579	3232	707
UZ9CWW	**5,348,520**	**2530**	**664**
UG7GWO	**4,018,555**	**2531**	**509**
UI9AWH	**3,771,684**	**2477**	**567**
UZ0AXX	**2,592,160**	**1920**	**544**
RZ9OWA	2,558,304	1810	486
UV9UWW	2,390,325	2015	525
UZ9CYP	1,521,640	1232	436
UZ9CXA	1,476,172	1190	428
UZ0QWT	1,454,988	1910	444
UZ0QWA	1,408,782	1493	426
UL8CWW	756,380	955	295
UZ9XYN	621,456	702	264
UH9HWB	**536,500**	**701**	**250**
UF7FWM	**416,540**	**606**	**236**
UZ9MWV	393,763	620	271
UZ9JWD	373,750	592	230
UZ9UZL	270,522	730	2269
UZ0OWO	242,780	429	244
UL8LWA	241,150	414	182
UZ0SXF	216,075	461	215
UZ0QXU	150,102	437	186
UZ0QWB	147,278	698	211
UZ9XWV	134,504	300	184
UI9BWK	252	15	12

EUROPE

UQ1GWW	**4,585,856**	**2744**	**704**
UZ6LWZ	**3,285,108**	**2290**	**665**
UP1BYL	**2,907,450**	**1999**	**630**
UR1RWX	**2,530,791**	**1870**	**603**
UP1BZG	**1,792,983**	**1401**	**557**
UB2JWS	**1,749,976**	**1586**	**551**
UP1BZO	1,530,224	1375	472
UB4MZA	1,195,080	1414	460
UB4MWA	1,186,048	1109	452
UZ1OWZ	1,151,558	1297	428
UZ3DXW	1,140,216	1332	462
UZ6HXK	1,087,060	1364	481
UZ4UWC	1,017,676	1215	404
UP1BYK	641,428	824	351

UB4IZA	592,416	768	374
UZ6AXJ	576,576	1017	396
UZ4PZZ	471,696	793	317
UB4VWA	466,200	605	300
UZ4AWB	424,258	713	318
UZ4FWE	398,145	675	285
UZ1NWO	**358,163**	**683**	**290**
UP1BZL	334,010	652	254
UZ3MWD	247,520	505	272
UZ3QYA	235,848	490	248
UP1BWB	218,064	507	264
UC1AWK	**203,256**	**392**	**216**
UB4TWL	174,930	339	210
UZ3SWL	174,492	417	222
UP1BZM/A	170,236	408	212
UZ3DXS	153,628	367	199
UZ4FWA	150,092	323	239
UP1BZQ	142,128	389	189
UB4IWN	127,835	373	185
UC1AWE	127,650	300	185
UT4UWE	122,940	288	180
UR1RWQ	117,900	368	180
UZ1QWW	109,053	335	189
UB4WZW	115,500	318	175
UR1RWL	97,970	279	194
UZ6XWC	89,976	266	184
UC1AWP	85,500	270	171
UZ3AXX	79,417	250	149
UR1RYA	65,364	250	393
UZ3DYF	61,750	204	125
UO4OWR	**61,087**	**225**	**127**
UP1BYC	59,488	224	143
UB4WYH	45,047	169	107
UB4RWW	34,556	125	106
UZ4SWF	21,600	118	100
R1WO	21,068	125	92
UZ3QZO	7,747	72	61
UB4LWP	7,392	60	48
UT4UWL	6,150	54	50
UQ1GYQ	3,366	42	34
UZ4YWW	1,725	27	23
UP1BYT	722	32	19

MULTI-OPERATOR MULTI-TRANSMITTER

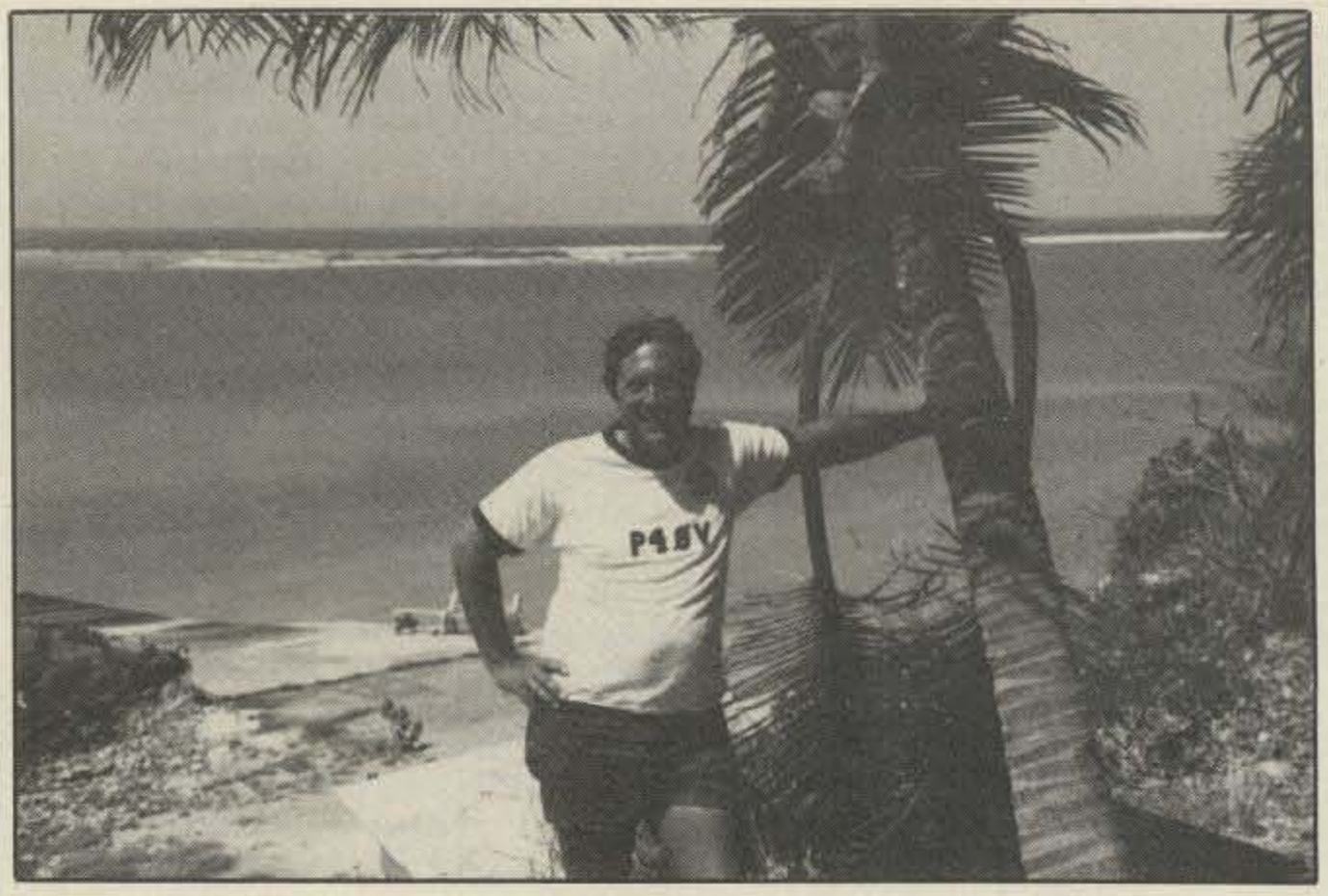
WORLD

KH6XX	**24,959,649**	**7584**	**949**
UP4A	**13,710,895**	**6022**	**979**
YT2R	**12,887,600**	**5217**	**1010**
LZ1KDP	**9,694,608**	**4569**	**903**
WL7Y	**9,513,010**	**3610**	**866**
Y34K	**8,050,845**	**4025**	**885**
IO3KVW	**7,663,042**	**3817**	**842**
KL7RA	6,907,868	3406	836
AX9LZ	**5,373,075**	**3431**	**465**
KC3EK	**4,134,920**	**2929**	**835**
JA9YBA	**3,980,106**	**2332**	**657**
ED4UPM	**2,507,313**	**2127**	**633**
NB6L	**2,414,448**	**2142**	**621**
JA1YFG	2,032,990	1460	526
PI4DEC	**1,094,662**	**1214**	**449**
5K7U	**781,560**	**698**	**312**
JA1YCV	91,905	250	165

DISQUALIFIED: LS1E (Op. LU8DPM)—Excessive duplicate contacts and unverifiable contacts.

CHECK LOGS: The following logs were used for cross checking. Check logs and SWL logs are always appreciated. Thank you.

AZ4M, CN8EK, CT1CKP, CT3BM, DL1DBM, DL4KBJ, EA1DXL, EA1DXS, EA3BSE, EA3CZM, EA5AN, EA5DIT, EA5DVL, EA5EFV, EA5EGT, EA5FKS, EA5JC, EA6SX, EA7DWD, EA7EBL, EA7GBD, EA8AMX, EA8VV, ED7CA, G0JCN, HA1UB, HA2E0A, HA4XX, HA7MY, HG7JBN, HJ7MQC, HK3MAH, IK2IKW, IK2JEX, IK4HPU, IK4JQQ, IK5CAY, IK7ISP, IN3PEE, JI1JVG/1, JR9EUZ, K1SSN, K6FM, K6JG, KA1RRL, KA9EFX, LA2KD, LA5LT, LA5XFA, LA7R, LA9DAA, LA9HAA, LU1YD/D, LZ1HY, LZ1KBG, LZ1KHB, LZ1KNP, LZ1KOZ, LZ1KSS, LZ1KZM, LZ2KDR, N0IZZ, N6CFQ, OH1XX, OH2BYS, OH3HS, OH6RC, OH6SO, OH7NGM, OH8TA, OK1DWG, OK1ORA, OK2-9329, OK2BJR, OK2SG, OK8ABR, ON5FV, OZ1GHS, OZ1IOC/A, OZ4NA, OZ5EDR, PP5IA, PT2BW, PY1AJK, PY1OL, RA1OAK, RA3AC, RA3AR, RA3DAD, RA3DDU, RA3DR, RA3DRC, RA3EA, RA3OUA, RA6ANZ, RA6LPY, RA9ABD, RA9CQW, RA9FA, RA9UCP, RB5IGN, RB5VT, RW3AG, RW3AT, RW6AZ, RZ0CZZ, RZ3AM, RZ3DM, RZ3DX, SM0CSX, SM2NTU, SM2PTR, SM4JUW, SM4SET, SM5FBL, SM6CDN, SM6GOR, SM6KMD, SP1DMD, SP2DKI, SP2LQP, SP2ZT, SP3BYZ, SP3CDQ, SP3GVX, SP4AS/4, SP4BY, SP4HKN, SP5BNB, SP5DIR, SP5ENA, SP5SAQ, SP7AWG, SP7DBI, SP7LHX, SP7MOQ, SP8JMA/A, SP8LZO, SP9BXT, SP9CTT, SP9DBE, SP9ENV, SP9EWU, SP9HZF, SP9JPA, SP9MDW, SP9MZP, SP9ODY, SP9PKR, SP9PT/9, TF6PS, UA0FDX, UA0FS, UA0QO, UA1OT, UA3-126-551, UA3ACJ, UA3AGX, UA3AHA, UA3AQO, UA3DAO, UA3DEV, UA3DRB, UA3DUA, UA3EDH, UA3LAR, UA3PIU, UA3RGG, UA3TG, UA3ZOY, UA4ACP, UA4CDC, UA4CDL, UA4HJA, UA4PMK, UA4WH, UA6LCW, UA6LF, UA6LIG, UA6LQZ, UA6XDL, UA9CB, UA9OO, UA9UEO, UB0QQ, UB3IWA, UB4CWA, UB4CWW, UB4EYJ, UB4FXX, UB4QWW, UB5CCP, UB5EFW, UB5GEI, UB5IJI, UB5IMD, UB5JOO, UB5KV, UB5SDW, UB5VAA, UB5YDX, UB5ZBP, UB5ZHQ, UC1AWZ, UC2AFA, UC2LIC, UC2OCH, UD7DWV, UI9BWE, UL7JZ, UL7TV, UL7VV, UM8MAU, UM9MZZ, UO5OBD, UP1BWC, UR1RYO, UR2REA, UR2RMC, UR2RQB, UT4UH, UT5GM, UT5UCK, UV3DF, UV3MM, UV4CD, UV6HB, UV6HP, UW0CA, UW0CM, UW0CW, UW4NN, UW6AL, UW6DY, UW6HS, UW9AO, UW9CL, UY5GG, UZ1CXF, UZ1NWD, UZ3AC, UZ3AWW, UZ3DXC, UZ3DXH, UZ3RWQ, ,UZ3TT, UZ3WWW, UZ4PXK, UZ4PZP, UZ4WWB, UZ4WWC, UZ6AXS, UZ6HR, UZ6LYQ, UZ6PWA, UZ9AZO, UZ9CWA, UZ9FZO, UZ9MWJ, UZ9UZT, VE3OMU, VK4NJQ, W3ARK, XE2AYF, Y21DG/A, Y21UC, Y22AN, Y22GC, Y22HF, Y22OO, Y22TF, Y22TO, Y22UB, Y22YJ, Y23CJ, Y23HE, Y23PF, Y23SF/A, Y24EA, Y24EG, Y24MJ, Y24VF/A, Y24YM, Y25FI, Y25II, Y25MG, Y25PE, Y25TA/A, Y26DO, Y26NL, Y26WL, Y27AL/A, Y27FN, Y28TO, Y32PI/P, Y34XF, Y34XN, Y36SG, Y36UE, Y37QJ/P, Y38SO, Y38WE, Y38ZB, Y38ZM, Y41JH, Y42WB, Y43QF, Y45RJ, Y45ZJ, Y46IF, Y47MN/P, Y49MF, Y51YJ, Y53ID, Y54TO, Y54UH, Y54VA, Y54ZL/Y43EO, Y55UG, Y57ED, Y61XM, Y62SM, Y630I, Y63QI, Y66XA, Y71ZH, Y77TN, Y82KL, Y08AII, YU7KM, YU7SF, YV3BQS, ZS3Z.



Here's P40V trying to decide whether to swim or operate. Carl obviously did enough operating, judging by the results.

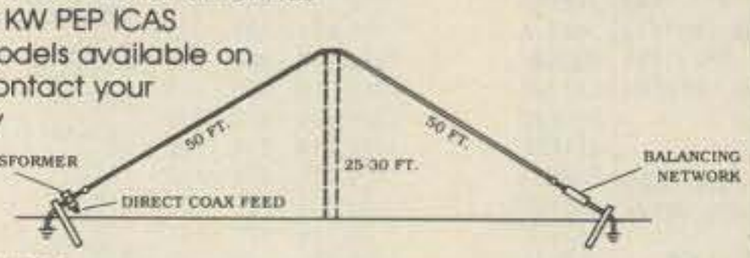
CONTINUOUS COVERAGE ANTENNAS FOR COMMERCIAL & AMATEUR SERVICE

Model AC 1.8-30

1.8 to 30 MHz

- SWR Max 2:1, 1.4:1 average from 1.8 to 30 MHz
- Can be installed in approximately 80 ft. space
- Ideal for commercial services for multi frequency operation without the need for antenna tuners or additional antennas
- Handles 1 KW, 2 KW PEP ICAS
- Higher power models available on special order. Contact your dealer or factory

$175.00
SHIPPING & HANDLING
ADD $4.00



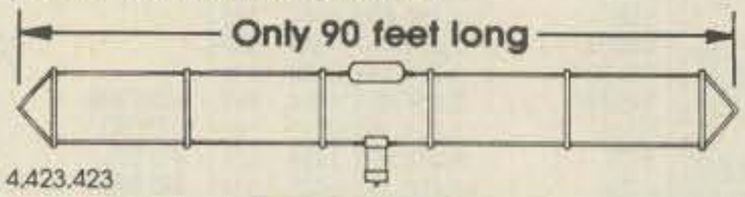
U.S. Patent No. 4,511,898

Model AC 3.5-30

3.5 to 30 MHz

- SWR less than 2:1 from 3.5 to 30 MHz
- Complete assembled. Balun terminated with standard SO-239 connector
- Power capability 1 KW - 2 KW PEP ICAS. Higher power model is available on special order.
- Designed for 50 ohm feedline
- Weather proof balun and balancing network

$184.50
SHIPPING & HANDLING
ADD $4.00



U.S. Patent No. 4,423,423

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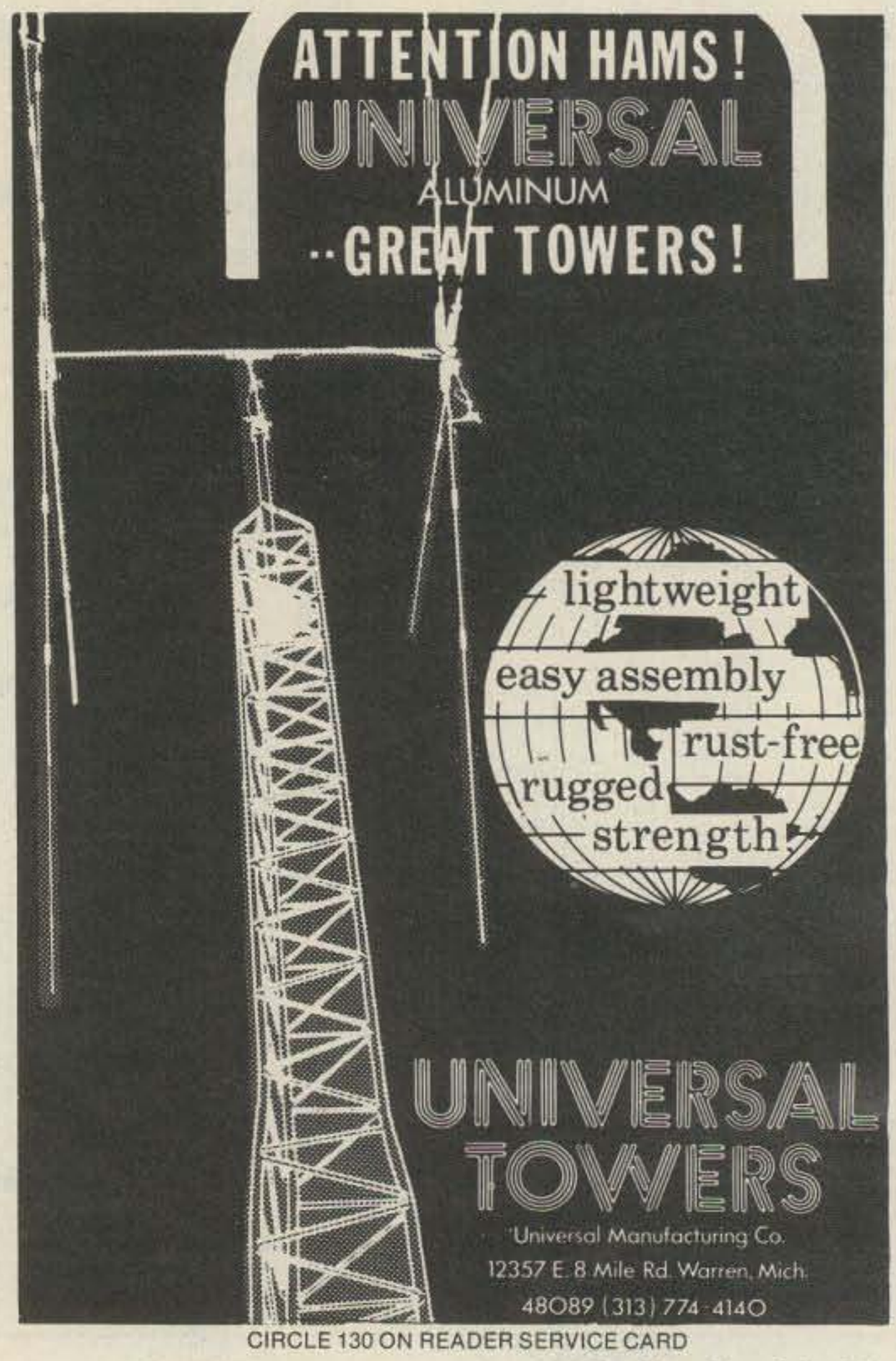

CIRCLE 130 ON READER SERVICE CARD

HF Equipment	Regular	SALE
IC-781 Xcvr/Rcvr/ps/tuner/scope ...	5995.00	Call

IC-761 Xcvr/Rcvr/ps/tuner	2699.00	**2369**
HM-36 Scanning hand microphone	47.00	
SP-20 Ext. speaker w/audio filter ..	149.00	**139.95**
FL-101 250 Hz 1st IF CW filter	73.50	
FL-53A 250 Hz 2nd IF CW filter	115.00	**109.95**
FL-102 6 kHz AM filter	59.00	
EX-310 Voice synthesizer.....	59.00	

IC-751A 9-band xcvr/.1-30 MHz rcvr	1699.00	**1469**
PS-35 Internal power supply	219.00	**199.95**
FL-32A 500 Hz CW filter (1st IF)....	69.00	
FL-63A 250 Hz CW filter (1st IF)....	59.00	
FL-52A 500 Hz CW filter (2nd IF)...	115.00	**109.95**
FL-53A 250 Hz CW filter (2nd IF)...	115.00	**109.95**
FL-33 AM filter.....	49.00	
FL-70 2.8 kHz wide SSB filter	59.00	
RC-10 External frequency controller	49.00	

IC-735 HF transceiver/SW rcvr/mic	1099.00	**949.95**
PS-55 External power supply.....	219.00	**199.95**
AT-150 Automatic antenna tuner ...	445.00	**369.95**
FL-32A 500 Hz CW filter	69.00	
EX-243 Electronic keyer unit	64.50	
UT-30 Tone encoder	18.50	

Other Accessories	Regular	SALE
IC-2KL 160-15m solid state amp w/ps	1999.00	**1699**
PS-15 20A external power supply.....	175.00	**159.95**
PS-30 Systems p/s w/cord, 6-pin plug	349.00	**319.95**
MB Mobile mount, 735/751A/761A...	25.99	
SP-3 External speaker	65.00	
SP-7 Small external speaker	51.99	
CR-64 High stab. ref. xtal for 751A....	79.00	
PP-1 Speaker/patch.....	179.00	**164.95**
SM-6 Desk microphone	47.95	
SM-8 Desk mic - two cables, Scan.....	89.00	
SM-10 Compressor/graph EQ, 8 pin mic	149.00	**139.95**
AT-100 100W 8-band auto. antenna tuner	445.00	**389.95**
AT-500 500W 9-band auto. antenna tuner	589.00	**519.95**
AH-2 8-band tuner w/mount & whip	659.00	**589.95**
AH-2A Antenna tuner system, only....	519.00	**449.95**
GC-5 World clock.....	91.95	**79.95**

ICOM

★ Large Stocks
★ Fast Service
★ Top Trades at AES®

VHF/UHF base multi-modes	Regular	SALE
IC-275A 25W 2m FM/SSB/CW w/ps	1299.00	**1069**
IC-275H 100W 2m FM/SSB/CW	1399.00	**1129**
IC-375A 25W 220 FM/SSB/CW **(c/o)**	1399.00	**899.95**
IC-475A 25W 440 FM/SSB/CW w/ps	1399.00	**1099**
IC-475H 75W 440 FM/SSB/CW.....	1599.00	**1289**
IC-575A 25W 6/10m xcvr w/ps	1399.00	**1129**
IC-575H 100W 6/10m xcvr.....	1699.00	**1499**
IC-471H 75W 430-450MHz base **(c/o)**	1399.00	**989.95**
PS-35 Internal power supply	219.00	**199.95**
AG-35 Mast mounted preamp	99.95	
AG-35 (Purchased with IC-471H)	99.95	**9.95**
SM-6 Desk microphone	47.95	
EX-310 Voice synthesizer	59.00	
TS-32 CommSpec encode/decoder....	59.95	
UT-15 Encoder/decoder interface...	34.00	
UT-15S UT-15S w/TS-32 installed.....	96.00	

VHF/UHF/1.2 GHz Mobiles	Regular	SALE
IC-37A 25w 220 FM/TTP mic... **(c/o)**	499.00	**349.95**
IC-47A 25w 440 FM/TTP mic... **(c/o)**	549.00	**399.95**
PS-45 Compact 8A power supply...	145.00	**134.95**
UT-16/EX-388 Voice synthesizer ...	34.99	
SP-10 Slim-line external speaker ...	35.99	
IC-28A 25W 2m FM, **TTP** mic	469.00	**409.95**
IC-28H 45W 2m FM, **TTP** mic	499.00	**439.95**
IC-38A 25W 220 FM, **TTP** mic	489.00	**349.95**
IC-48A 25W 440-450 FM, regular mic	459.00	**369.95**
IC-48A 25W 440-450 FM, **TTP** mic....	509.00	**449.95**
HM-14 Extra TTP microphone	59.00	
UT-28 Digital code squelch.....	39.50	
UT-29 Tone squelch decoder	46.00	
HM-16 Speaker/microphone	34.00	
IC-228A 25W 2m FM/TTP scan mic...	509.00	**449.95**
IC-228H 45W 2m FM/TTP scan mic...	539.00	**479.95**
UT-40 Pocket beep function.....	45.00	
IC-900A Transceiver controller.....	639.00	**569.95**

★ Package Special . . .
IC-900A Transceiver controller with **UX-29H** 2m/45W and **UX-39A** 220/25W band units.
$969.95

UX-19A 10m 10W band unit	299.00	**269.95**
UX-29A 2m 25W band unit.....	299.00	**269.95**
UX-29H 2m 45W band unit.....	349.00	**319.95**
UX-39A 220MHz 25W band unit....	349.00	**289.95**
UX-49A 440MHz 25W band unit....	349.00	**319.95**
UX-59A 6m 10W unit	349.00	**319.95**
UX-129A 1.2GHz 10W band unit ...	549.00	**499.95**
IC-1200A 10W 1.2GHz FM Mobile.....	699.00	**549.95**
IC-3200A 25W 2m/440 FM/TTP **(c/o)**	695.00	**499.95**
UT-23 Voice synthesizer.....	34.99	
IC-3210A 25w 2m/440 FM/TTP	739.00	**649.95**
AH-32 2m/440 Dual Band antenna ...	39.00	
AHB-32 Trunk-lip mount	35.00	
Larsen PO-K Roof mount.....	20.00	
Larsen PO-TLM Trunk-lip mount....	22.00	
Larsen PO-MM Magnetic mount	22.00	
RP-1210 1.2GHz 10W 99 ch FM xcvr	1529.00	**1349**
RP-2210 220MHz 25W repeater	1649.00	**1469**
RP-3010 440MHz 10W FM repeater...	1299.00	**1149**

Due to the size of the ICOM product line, some accessory items are not listed. If you have a question, please call. All prices shown are subject to change without notice.

MasterCard VISA

Hand-helds	Regular	SALE
IC-2A 2-meters.....	289.00	**259.95**
IC-2AT with TTP.....	319.00	**279.95**
IC-3AT 220/TTP **(c/o)**	349.00	**269.95**
IC-4AT 440 MHz, TTP	349.00	**299.95**
IC-02AT/High Power	409.00	**349.95**
IC-03AT for 220 MHz	449.00	**289.95**
IC-04AT for 440 MHz	449.00	**389.95**
IC-u2AT for 2m w/TTP	329.00	**289.95**
IC-u4AT 440 MHz, TTP	369.00	**299.95**
IC-2GAT for 2m, TTP	429.00	**379.95**
IC-4GAT 440MHz, TTP	449.00	**399.95**
IC-32AT 2m/440MHz	629.00	**559.95**

IC-u2A for 2m **w/o TTP**
Reg. $299 - **Closeout $249.95**

IC-12AT 1W 1.2GHz FM HT/batt/cgr/TTP	473.00	**369.95**
IC-12GAT Dlx 1/7W 1.2GHz FM HT/TTP	529.00	**469.95**

Aircraft band handhelds	Regular	SALE
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Just about everyone has noticed the remarkable change in the Russian amateur radio system in recent times. The goals of world peace and world cooperation have been incorported into the world of amateur radio.

Glasnost, Perestroika, and QSLs

BY H.B. MUTTER*, N3CBW

The author spent some time visiting Russian amateurs this past October, including a tour of the Central Radio Club, and the famous Box 88 QSL Bureau.

Thanks to the spirit of President Mikhail Gorbachev's *Glasnost* and *Perestroika*, years of restrictive operations for Soviet radio amateurs are on the way out. And closer cooperation, communication, and understanding with U.S. amateurs is a goal for Soviet amateur radio.

Prior to 1988, in a myriad of bureaucratic organization, Soviet amateurs had to contend with government and political control over their hobby. But last April *Glasnost* erupted at a government-sponsored amateur radio conference in Moscow where freedom was demanded in heated debates. The outcry for radio liberty was made and supported by some of the Soviet Union's leading amateurs. Besides the invited conferees, uninvited amateurs overflowed the facilities into the street determined to attend the historic conference. (The meeting's aftermath was reported in the Soviet magazine *Radio*, September 1988).

Soviet amateurs protested years of restrictions and controls that go back to the early days of radio. They were controlled not only in who and how they could operate, but were also dictated to in what they could or could not say. The lack of freedom of operations, however, was generally accepted as part of the homage paid to the Soviet system and political philosophies. During those dark days there were some mavericks who persisted outside of restrictions in trying to exercise a Soviet constitutional right for enjoyment of sport. While there is no evidence of hard punitive action against these activists, nevertheless some of them were harassed and had their operating rights suspended for periods of time.

This is where your QSL cards arrive—the Box 88 Incoming QSL Department.

Amateur radio activities in the Soviet Union are considered a sport, and along with other sport-like activities such as flying, sailing, hunting, etc., they are controlled by a military organization known as DOSAFF. From DOSAFF, control filters down through the Krenkel Central Radio Club of the USSR (CRC) in Moscow to a Federation of Radio Sport and various regional or city radio clubs. (The military aspects of DOSAFF are somewhat similar to reserve military preparedness.) In addition to command and control features, DOSAFF is the source of financial support for sport activities in the USSR.

Vasily M. Bondarenko, Chief of CRC, at an interview in Moscow acknowledged government efforts to free up amateur operations in the spirit of *Glasnost*. Referring to the past as past, Mr. Bondarenko has his sights on the future for Soviet amateurs. He stated, for example, that Soviet amateurs may now operate whomever they wish and packet radio is now in limited operation. SSTV, mobile, and repeater operations will soon be authorized for the USSR. Home QSL information, including the sending of photographs as part of a QSL card, are authorized.

Recognizing that in the past some Soviet amateurs appeared curt and short in their contacts, Mr. Bondarenko attributed this to a language barrier and ITU restrictions on QSOs—limiting QSOs to strictly radio matters. These international

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CIRCLE 74 ON READER SERVICE CARD

If you look carefully, you might see a card for you in this view of the Outgoing QSL Department.

rules on QSOs will be scrutinized with the aim to allow, perhaps, a more realistic approach," Mr. Bondarenko offered. Some Soviet amateurs voiced the opinion that limiting the content of QSOs was a means of controlling contact with the west. Nevertheless, all concerned acknowledged that *Glasnost* is attempting to correct a paranoid-like past.

The Chief of CRC, Mr. Bondarenko, also issued an invitation to interested amateur groups or organizations to visit their Soviet counterparts to begin a dialogue for better understanding and coopera-

The author, on the left, is being welcomed by officials of the Central Radio Club (CRC) in Moscow. From left to right: H.B. Mutter, N3CBW; Vasily M. Bondarenko, Chief CRC; Nickoli V. Kazanskey, UA3AF, Deputy Director CRC; Vera S. Sviridova, Box 88 Manager; Victor Tkachenco, UA6LA; Andrey Trofimovich, UV3EE, Section Chief Radio Sport CRC; and Serge Kazakov, RU3DF, Chief Technical Dept. CRC.

tion. "The Soviet amateur," he said, "is just as anxious as any other amateur to be part of world radio sport." He also added that "within the spirit of *Glasnost*, Soviet amateurs are anxious to sit down with international friends and trade information and plan for mutual activities. We would like to see joint DXpeditions, and we are certainly willing to provide assistance especially into rare Soviet call areas. We also think that getting together can erase some problems about exchange of QSL cards and obtaining certificates or awards."

The USSR has several problems, one of which is foreign exchange, which hampers Soviet amateurs. They have problems in obtaining IRCs to send, while receiving them is no problem. Paying for awards is also a problem, as well as using hard currency for foreign trips or literature or buying foreign-made equipment. Because of a great equipment shortage, there would be a tremendous market in the Soviet Union for used equipment if a way for some sort of exchange or goodwill donation program could be worked out. While for us, the past cannot be readily overlooked since it is history, nevertheless any effort at freedom should be encouraged.

There are big changes going on in the USSR, hopefully of a lasting nature. For Soviet amateur radio, it is a time of freedom to enjoy the hobby as an arm of international cooperation and friendship.

Thanks to many Soviet amateurs from the areas of Rostov-on-Don, Leningrad, Kiev, Rovno, and Moscow and radio officials for their assistance, cooperation, and hospitality in making my trip to the Soviet Union unforgettable and helping to obtain information for this article.

Many Soviet amateurs support the need for increased power authorization for up to 1 KW, and although the CRC is receptive to the idea, it fears that the problem of potential interference from high-power operations is a formidable obstacle for change. There is a decided shortage of measuring equipment available to authorities so that new or different operations are delayed for approval or are just not allowed. In the Soviet Union the burden is on the amateur to establish correct operations before approval of operating rights. The lack of measuring equipment, and as a matter of fact radio equipment generally, is another bone of contention for the amateur. Many amateurs have voiced criticism of DOSAFF for not authorizing more resources for amateur radio.

Anatolij Gorokhovskij, Editor-In-Chief of the Soviet monthly magazine *Radio*, observed that the great advancement in the technology of amateur equipment requires that more resources be made available to Soviet amateurs. Up to now they have built their own equipment and have managed to keep up a respectable performance record. However, the new advancements and innovations in electronic and computer technology are beyond the means of home laboratories, and unless state-of-the-art domestic equipment is reasonably produced, the Soviet amateur will be seriously handicapped.

Radio magazine covers news, information, and features for radio, computer, and electronic sports in the Soviet Union. It is not exclusively for amateur radio, and many Soviet amateurs complain that they do not have a *QST*- or *CQ*-like magazine. *Radio*'s editor-in-chief would like to see a closer cooperation with magazines such as *QST* or *CQ* for the exchange of articles. For example, he thought that an article about amateur radio assistance during the Chernobal disaster written by UZ3AU and published in the April 1988 edition of *Radio* would be of interest to U.S. amateurs. Mr. Gorokhovskij invited any amateur radio magazine "to sit down with us and see if we can work out a plan for mutual exchange of information and ideas. Soviet amateurs are interested in learning about U.S. operations and techniques especially since they will now be permitted to work their sport with little restrictions." CQ

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CIRCLE 55 ON READER SERVICE CARD

Here's a handy little device for your workshop or shack that you can build easily and quickly for a few dollars.

The Spark Zapper

A Static Electricity Discharge Device

BY GEORGE S. PEACOCK*, W4WYV

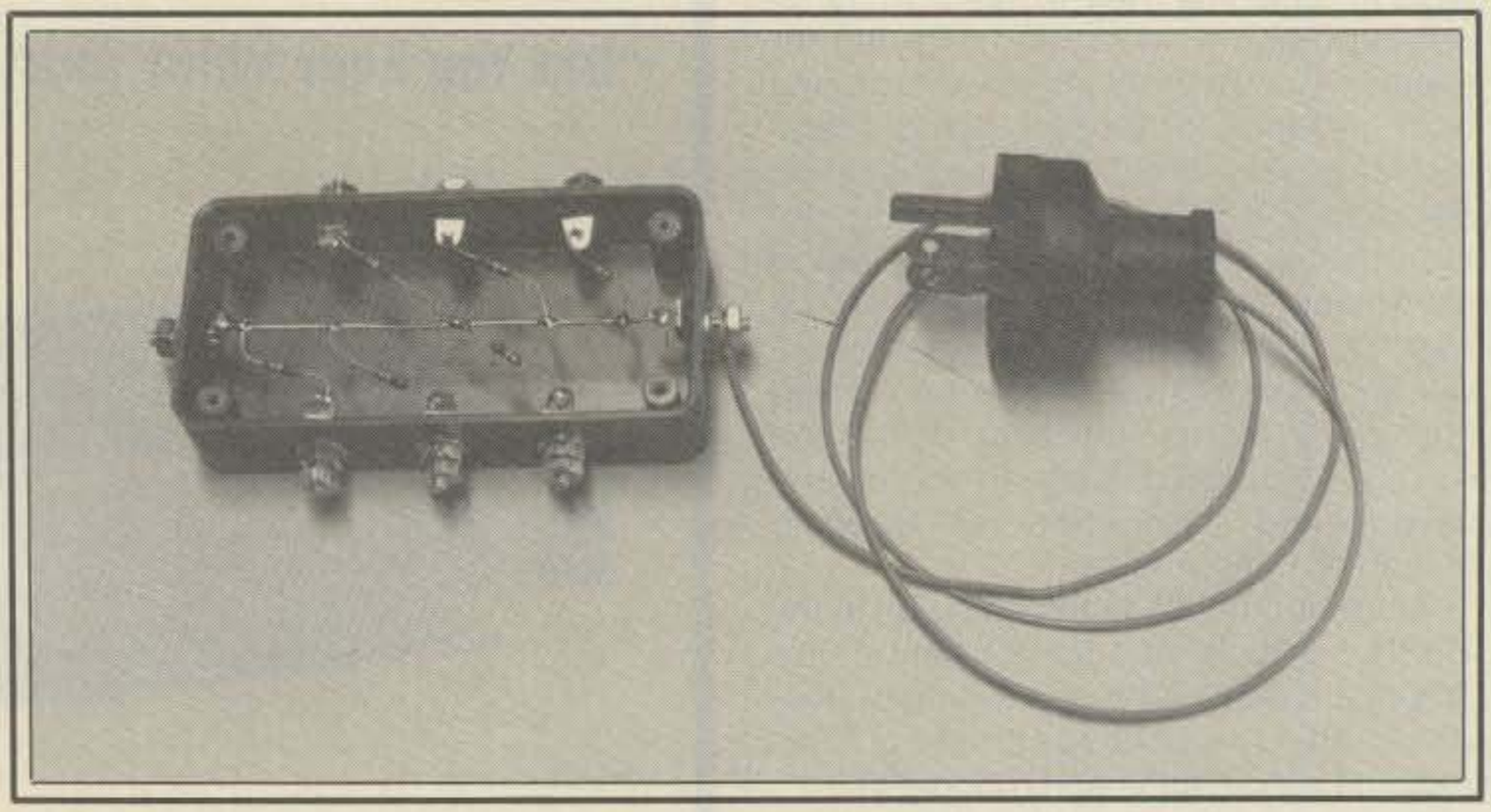
It is interesting to note how things change. I remember when the practice for working on a radio or other electronic equipment was to keep one hand in your pocket, wear rubber-soled shoes, and stay away from anything grounded such as cabinets, wire, metal work benches, etc.

Now we've come full circle. We want everything tied to ground, including our bodies. We want our bodies to conduct and discharge static charges through grounding devices so that we don't destroy the electronics.

The equipment has changed, but the old rules made a lot of sense if you were poking about in a tube transmitter with several hundreds or thousands of volts floating around. Those kind of volts can reach out and grab you, knock you down, or worse, kill you.

We used to be afraid of electrocuting ourselves, and while there is still potential danger in most equipment, our main concern is protecting delicate semiconductors. Today many of these devices can easily be wiped out by a spark generated by combing your hair. In fact, you do not even have to have a noticeable spark to damage some of these devices. Static charge of less than 3,000 volts is hardly noticeable, and while you do not see or feel them, small charges of only a few hundred volts can easily damage today's equipment. Sometimes I have had bad dreams about ruining my expensive radio equipment just by touching the circuit boards with my fingers. Walking across a carpet on a low-humidity day can generate a 35,000 volt charge, and just wiggling your rear around on your work-chair cushion may generate up to 10,000 volts. So the order of the day is protect it or lose it.

Recently, the need to add another card to my computer got me to think about protecting it from accidental damage by static electricity. My first thought was to go to the nearest electronic-supply house and check out the cost of conductive wrist-straps, conductive mats, and the like. But then I decided to see if I could use some existing junk in my shack to remedy the situation. This led to the construction of the "Spark Zapper."



The finished Spark Zapper. The ground wire is connected via the ground pin in the AC outlet, only after you have checked and measured that it does indeed go to ground.

Circuit Description

The circuit of the Spark Zapper is very simple, as can be seen from the diagram. Advertising literature for professional devices suggests that wrist straps, foot mats, etc., have a resistance of around 1 megohm. This led to the selection of that value for the resistors in my circuit. Actually, the value is very noncritical. You can use anything from 100 K to 10 megohms. The box in the accompanying photo-

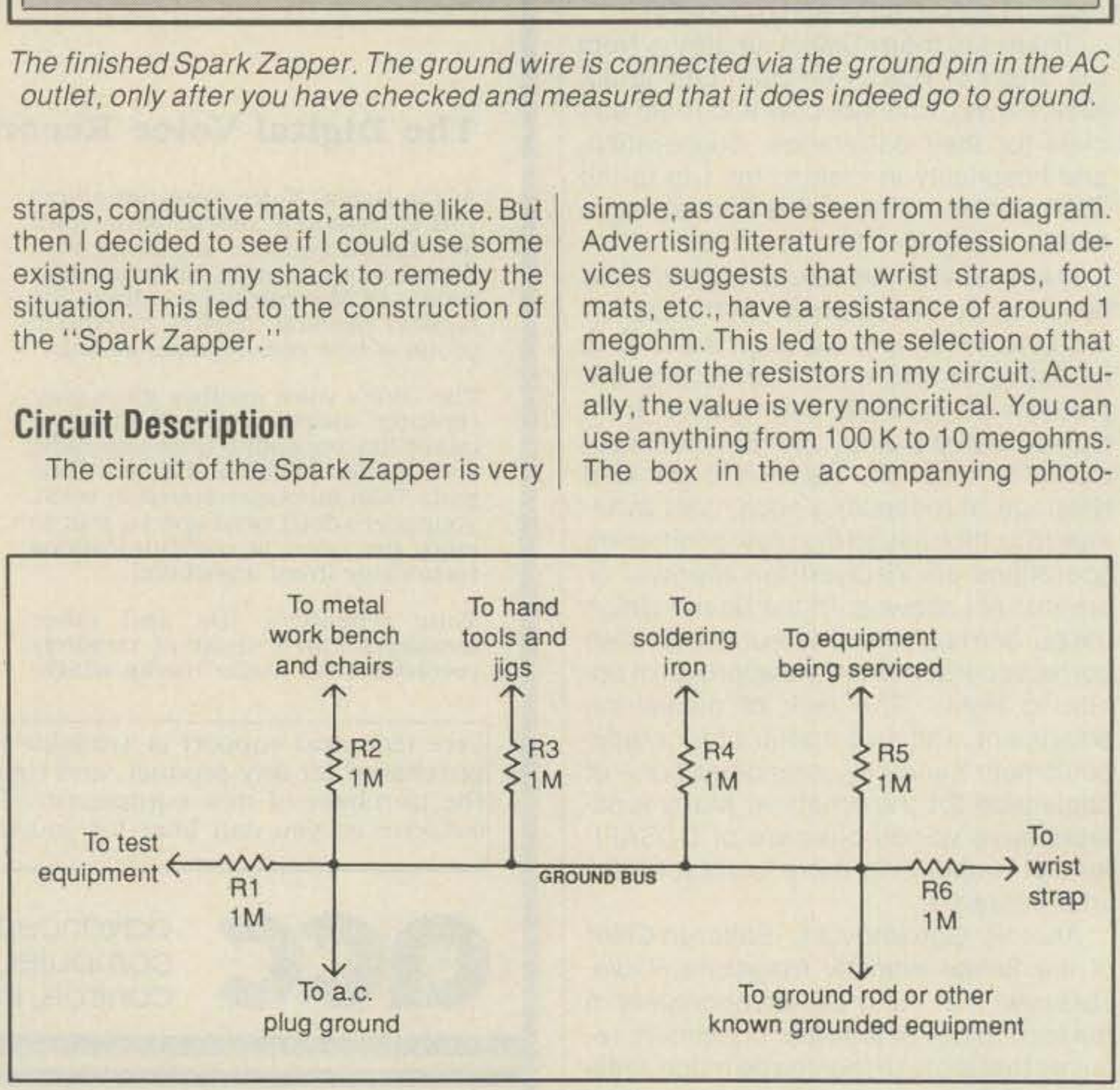


Fig. 1– Schematic diagram for the Spark Zapper. R1 through R6 are 1 megohm resistors (see text). Any number of resistors and terminals may be used.

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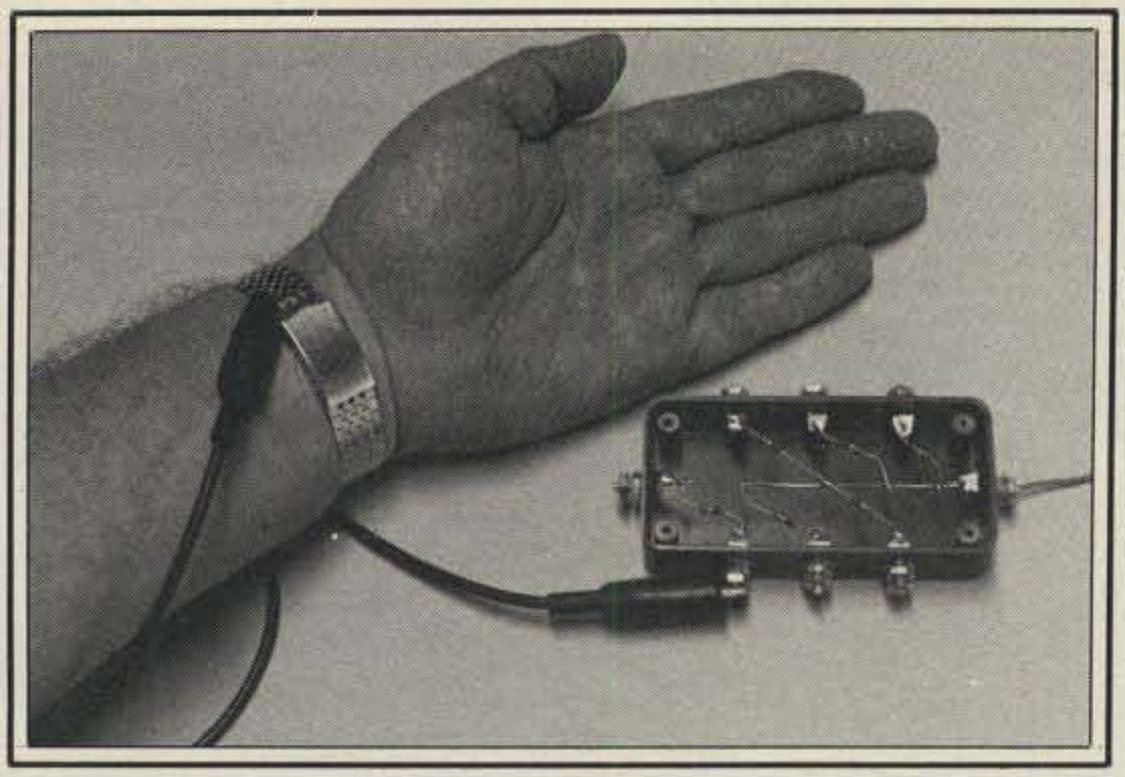

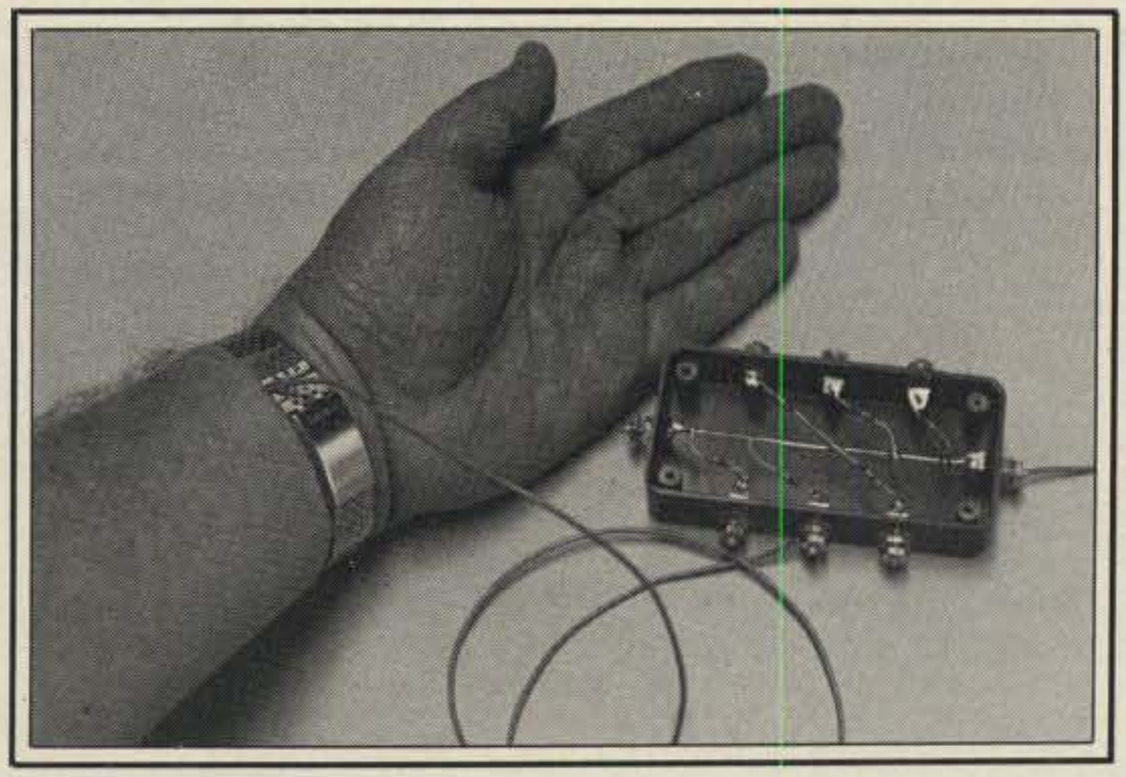

Two methods of connecting the wrist strap to the Spark Zapper. On the left is shown an ordinary clip lead, and on the right a few turns of hookup wire are wrapped around the strap.

graphs is built with ¼ watt, 100 K ohm resistors because I happened to have plenty of them. Values less than 100 K may allow hazardous currents to flow, and anything more than 10 megohms starts to become ineffective. Two terminals are provided for the main ground bus, and the other terminals have series resistors tied back to the bus. Any number of resistors and terminals may be used.

Construction

The Spark Zapper is built in a Radio Shack #270-220 plastic box which measures about 4″ × 2″ × 1″. The terminals are number 6 × 32 × ½″ long screws with two nuts for each screw. One nut is used for mounting and the other forms a convenient screw-down terminal for attaching wires. The screws also have enough length for easy use with clip leads.

Be careful with a soldering iron around plastic boxes. I soldered the resistors to the solder lugs outside the box to avoid melting the plastic and then did the final mechanical assembly. A piece of #18 solid wire forms a convenient bus down the center of the box.

Using the Spark Zapper

IMPORTANT: UNPLUG AND DISCONNECT EQUIPMENT to be worked on. You don't want to be tied to a piece of live equipment with a wrist strap. BE SAFE.

Before using the Spark Zapper you need to check your grounds to make sure

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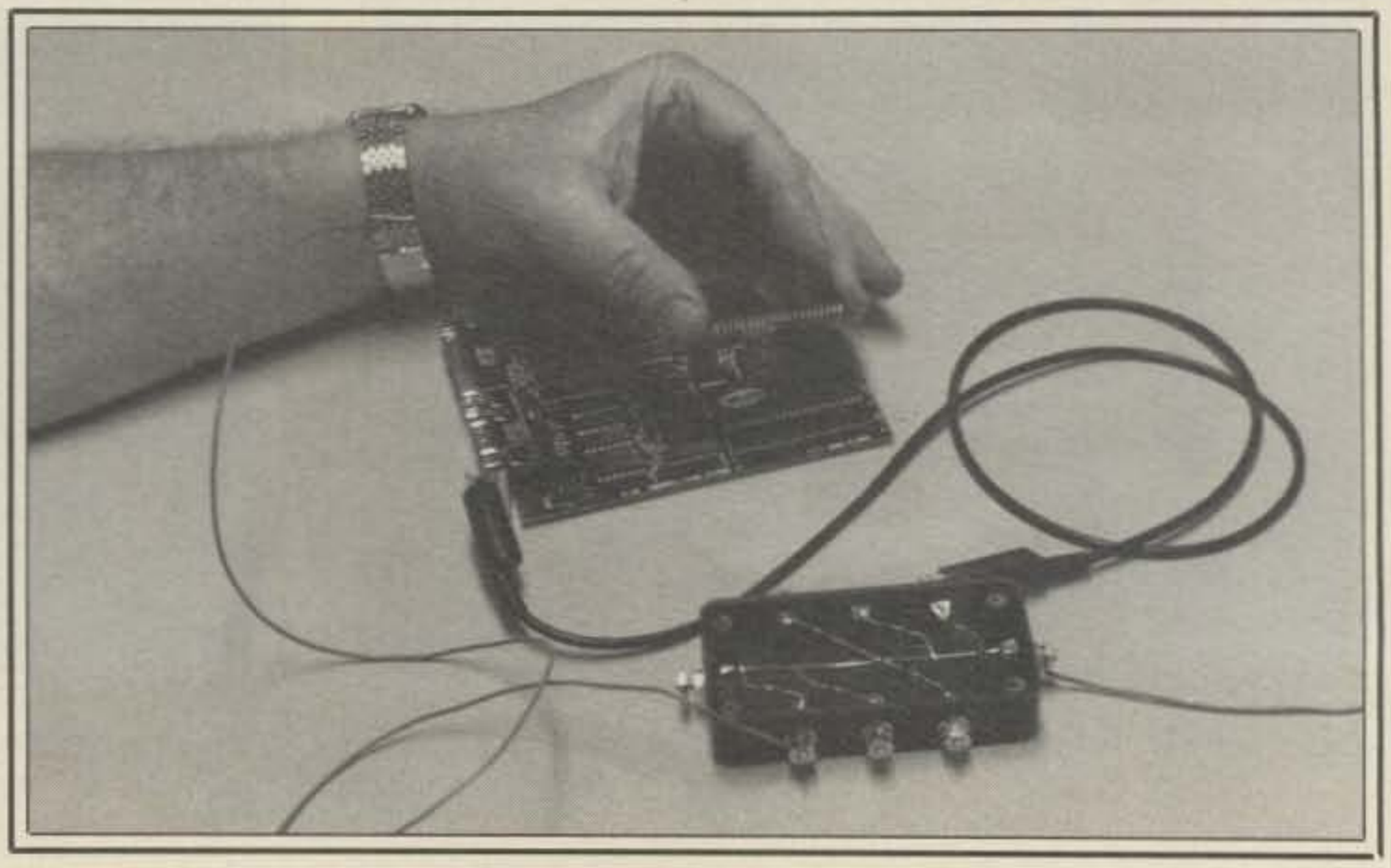


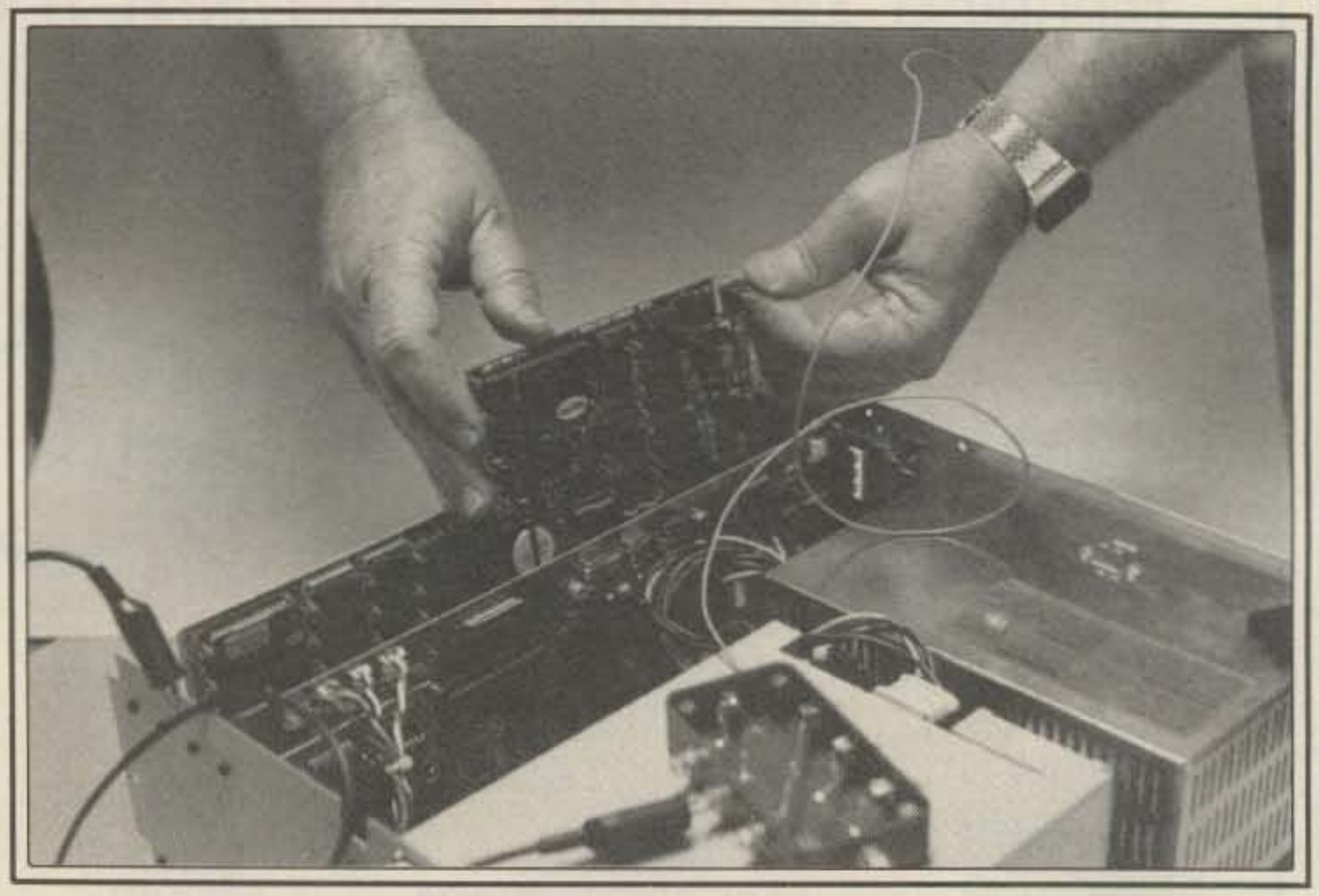
Using the Spark Zapper to change an IC.

they really are ground. Use a VOM to check your work-bench ground against a ground rod or other known source. First check for floating AC voltage and then check for a good low resistance connection. I use the third or ground pin on the AC receptacles of my work bench for a convenient ground connection. A single wire to the ground pin of a 3-pin AC plug makes a simple and easy connection for the Spark Zapper. If you use this arrangement, please make sure that you have wired the plug correctly and **DO NOT TAKE CHANCES**. Check your wiring with your VOM. **DON'T** plug yourself into the hot side of the AC line.

Once you have made the ground connections to the Spark Zapper box, you can then connect any other needed equipment. Suggested items to be connected are metal work benches and chairs, soldering irons, tools, test equipment, wrist straps, foot mats, the equipment to be serviced, etc.

Many soldering irons have a 3-pin plug for grounding at the AC socket. If yours does not have this, connect the metal barrel of the iron to the box with a clip lead. I also connect my VOM to the box. The obvious homemade wrist strap is my own wrist watch. You can connect it with a clip lead or wrap several turns of stripped stranded wire around it. I like the stranded-wire arrangement better because clip leads tend to slip off when moving around. A good way to keep your tools at ground is to put them in a pie tin and connect the pie tin to the Spark Zapper.

Have fun with the Spark Zapper. Use it carefully and you won't zap your equipment or yourself. CQ



Using the Spark Zapper when working on PC boards.

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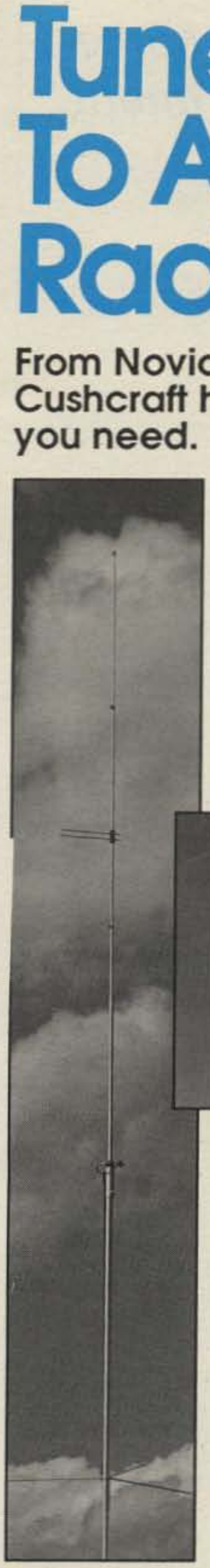

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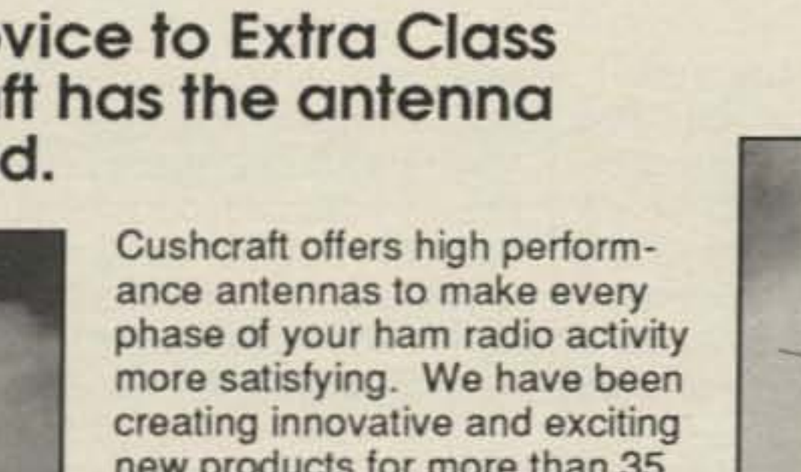

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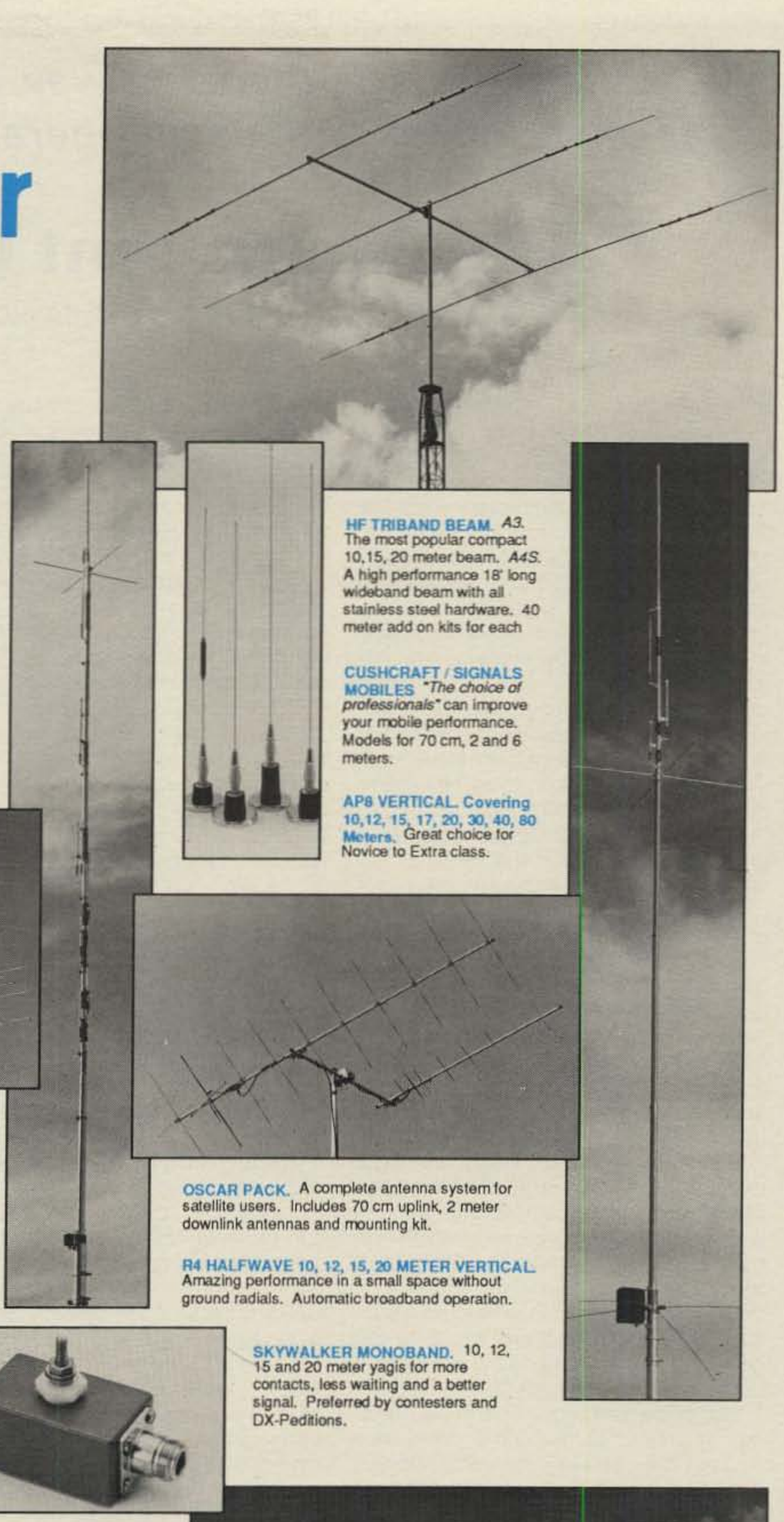

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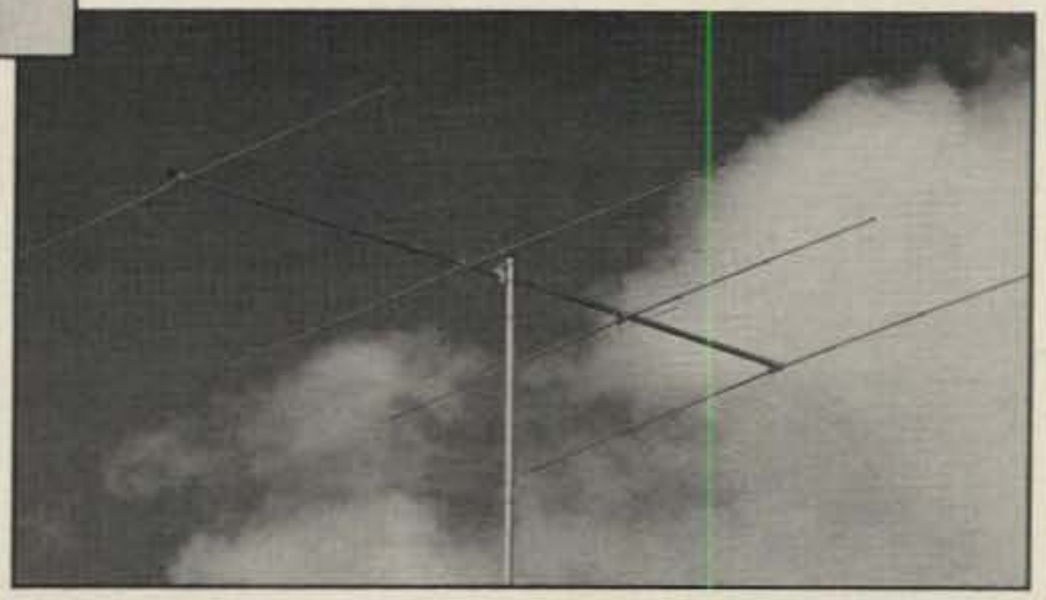

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Where there is a will, there is a way. KA3RCH shares some of his experiences with us on operating from an apartment.

The Apartment Operator

BY LEE BAKER*, KA3RCH

Few amateur radio operators have not experienced problems finding the place and space to erect a good, functional antenna, but apartment dwellers suffer more than the average amateur. I'm sure there are many amateurs operating HF who understand this all too well. Unsympathetic landlords, TVI and RFI, lack of antenna room, poor signal propagation, and a total overall lack of operating space are only a few of the obstacles facing those living in apartments. Some amateurs in this predicament give up operating on HF and devote their hobby to VHF and UHF operation. As a fresh Novice operator at the time I enjoyed HF DXing most and decided to find a solution.

Lacing an attic and without room to run an antenna up or out, I was faced with a significant hurdle. My first attempt to get on the air resulted in the erection of a simple 40 meter dipole along the outside wall in back of my apartment. Being far from optimum, it ran from one drain pipe to another and was held off the brick wall by a series of insulators. Installation was easy, as I could only get it about 7 feet off the ground. The only problem I experienced was answering the police officer's questions when he probed me about my intentions. It seems one of my neighbors thought I was up to no good. After completion, the copper-colored wire blended well with the brown brick wall and was almost invisible from more than a few meters away. This aided in acceptance by the management. Despite being in a poor location along a wall and close to the ground, the antenna gave me acceptable performance on 40 meters.

Not long after I began operating, one of our neighbors came to the conclusion that the lines on her TV were connected with the lines running in my window. I explained to her when she arrived at my door that I was an amateur radio operator. Although she wasn't impressed, she accepted my assurances that I would attempt to correct the problem.

That very day I improved the ground on my radio, installed a balun on the antenna, and bought an antenna tuner, in addition to the low-pass filter already in place. It took only a few more days of operation before my neighbor was back at my door. After more apologies I sat back to rethink the problem. All of my TVs and radios were clean of interference, so I came to the conclusion that either my neighbor's TV suffered from a cheaply made front end or the location of my antenna was causing inductance into some of the wiring in the apartment building. Because none of my other neighbors complained of TVI, I figured the problem was with her TV. I discussed the problem with her and offered to add an AC line filter and a high-pass filter to her set. She didn't like the idea of anyone messing with her TV, so we came to the mutual agreement that I would limit my operation to certain times of the day. Not wanting to cause hard feelings with my neighbors, I had no reservations about these restrictions. Peaceful coexistence meant avoiding transmissions during prime-time television in the evening and the soaps in the morning. A few months later we moved into a larger apartment in the next building. The 40 meter dipole, by then doubling as my 80 meter antenna with the aid of the antenna tuner, came down.

The first thing moved to my new apartment was my rig. This apartment was on the third floor, making antenna installation more difficult than before, but the height would improve propagation. Unfortunately, the 40 meter dipole was no longer feasible in this new location due to its length.

Using my ancient copy of the *ARRL Amateur Radio Handbook*, I put together an end-fire array dipole for 10 meters. Hanging out my window late at night, I strung my wires from the bedroom all the way to the livingroom balcony. A crowd grew in the parking lot below as I worked the wires in place. I heard one fellow comment that I was probably wiring a bomb, while another thought I was trying to commit suicide. I put them all at ease with an explanation and returned to my radio for a test. Over the next few days I gave my best try at getting out good signals, but success was very limited. I tried a few other variations but without further improvement. I knew 10 meter propagation was coming back, but the 10 meter dipole variations simply were not effective enough to overcome the deficiencies of my inefficient installation. Increasingly frustrated at my attempts to get back on the air, I decided to try a mobile antenna. I purchased a bumper mount and a whip antenna for each of the 80 and 40 meter bands and mounted them to my balcony rail. Surprisingly, the 80 meter whip proved to be the most effective. From my location in Glen Burnie, Maryland I was able to get solid QSOs through most of the New England area and west to Michigan.

By this time I had earned my General ticket and wanted to try some SSB on 20 meters. I purchased another whip for 20 meters and had it mounted out on the balcony the same day. However, try as I might, I could not get a solid contact. Further experiments with antenna pruning, angle modification, and grounding did not yield significantly better results.

Time again for the old dipole. I mounted a 33 foot dipole outside on the front of the building in an evening and tried it out the next day. It had no directional capability, narrow frequency band width, and was still mounted next to the wall, but it worked well enough for contacts across the US. No TVI or RFI complaints, and the apartment management did not seem to mind the external antenna. I was finally back in business again, although somewhat limited—80 meters on a whip and 20 meters on a dipole.

Lately, business requirements have kept me away from my rig more that I would like. Consequently, I haven't had much opportunity to improve my antenna situation much. I am far from being an expert on the topic of limited-space operation, but through trial-and-error methods I've learned a few basic lessons for operating from an apartment.

- TVI and RFI are the biggest obstacles to overcome while operating out of an apartment. Antennas can be made large or small to fit almost any situation, but a dirty signal can shut down a station. Proper rig grounding and good filtering are the cheap and basic steps to preventing interference. Additionally, an antenna tuner can help reduce harmonics transmitted to the antenna.
- The apartment management's biggest complaint about operating an amateur station from an apartment is unsight-

*6315 Harris Heights Ave., Glen Burnie, MD 21061

Say You Saw It In CQ

ly antennas. The best solution is to disguise antennas so the management has nothing to complain about. This doesn't mean erecting an antenna behind the management's back, but the rule of thumb is "out of sight, out of mind." Ingenuity is best put to use here. Beams and verticals are very difficult to put up, as most apartments have tenants above them and almost no space for overhead mounting. This limits the operator to a variety of whip antennas and many variations of long-wire and dipole configurations.

• Courtesy is always a standard of amateur radio, but it applies best to apartment operators. In some situations an operator cannot completely eliminate TVI or RFI to a neighbor's TV or radio because of the close proximity or particular construction of the equipment being interfered with. In this instance an understanding neighbor goes a long way in keeping the amateur station on the air. Compromises in output power and operating times may have to be made, but maintaining a good attitude towards one's neighbor will usually help reduce these compromises.

The primary lesson I've learned from amateur operating out of an apartment is that it is difficult, but no matter how restricted your space, you can always manage to get your signal out. CQ

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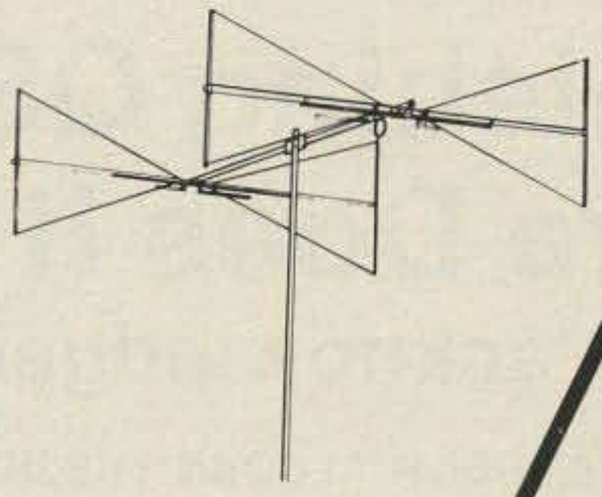

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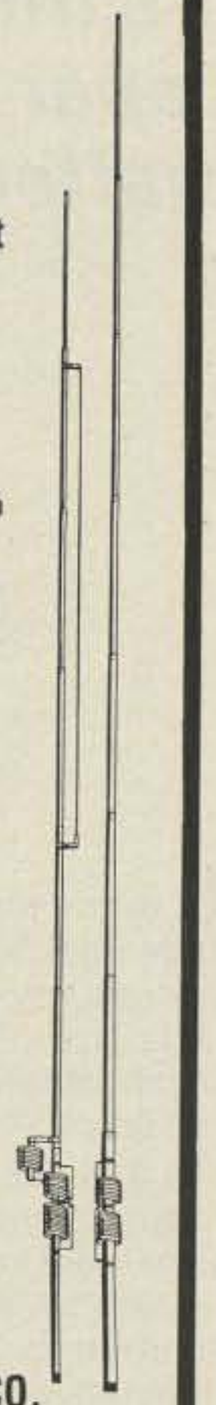

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It's true! KB2BXH has the courage to put down on paper what a lot of amateurs feel and think (no matter what state they come from).

The Vanishing QSL Card Where Does It Go?

It's not returned, acknowledged, or confirmed

BY SAMUEL R. ALCORN*, KB2BXH

In a completely unscientific survey of amateur QSL practices and award programs, I have discovered a few muddled facts. Now, don't get me wrong. I'm surely not out to malign the good name of any individual amateur, state, or country. It's just that as I whittle away at my Worked All States and DXCC awards, I don't know what more I can do to get a brother amateur to QSL a completely legitimate QSO short of begging on front doorsteps, threatening terroristic actions, or yielding the tax deduction for my first-born son.

Part of the problem with the All States award is that you need verifications from 50 states to qualify for the certificate. That sure seems like a noble and even honorable goal, but I think the sponsors of the award program have unwittingly failed to realize that Rhode Island, Delaware, and Vermont simply ceased to exist some time back.

I really don't know what happened to those three precious states. I must have missed *The New York Times* story detailing the merger, acquisition, or natural disaster. All I know is that I don't hear amateurs from those states any more. Given the new realities, I think it is high time that the Worked All States officials count 47 states as enough for the certificate, and I'm sure the program sponsors will agree once they are made aware of the situation.

The more I think about it, however, the more I believe 46 states should qualify for a Worked All States award. That's because New Hampshire operators, who have been known to work 80 and 40 meters from time to time, for some unclear reason have banded together in a coalition swearing to never, ever verify a contact with a ham from New Jersey.

Now I don't exactly have the goods on why those fun-loving ops from the Granite State would want us nice folks from the Garden State to go without their QSLs. Maybe it was something said at a New Jersey ham fleamart and taken the wrong way that started the whole thing. I don't know. For the record, I think New Hampshire is a swell state.

All I know is that of New Hampshire's 3,063 (according to a recent edition of *The Callbook*) amateur radio operators, I have QSOed with five of them and all five have failed to respond to my QSLs and follow-up requests. A friend suggests that repeat requests are rolled into fireplace logs, thus ensuring a supply of winter heating material. The heavy volume of mail also helps the U.S. Postal Service stay afloat.

Being from New Jersey, though, I think I know what part of the problem is. We New Jersey hams represent more than 3% of the country's overall amateur population. That's a pretty hefty chunk, and you can bet your last SWR meter that a Hawaii-based amateur faced with the choice of QSOing with a South Dakota or New Jersey station will most certainly choose the South Dakota ham.

I just know the guy sitting pretty in Hawaii is muttering something like, "Another darn Jersey station clogging the airwaves." It certainly doesn't help being lumped in the bulging second call district with New York, either. It is a well-documented fact that no ham has ever called CQ NJ or CQ NY.

Matters are even worse on 20, 15, and 10 meters, where the magic of propagation can cast your signal around the globe. You'd think a guy in Malta would be thrilled to hear a New Jersey station coming back to his CQ. But no. He'll dance around the New Jersey boy, chat with Pennsylvania and Maryland, and then pull the plug rather than waste power QSOing with the Garden State. Reading between the lines: New Jersey isn't DX, it's SW (So What).

Sure, we New Jersey hams get some DX. Personally, I've had the pleasure of working numerous European stations, although from what I gather, most of these folks were on the air for the first time and were just pleased as punch to have *anyone* call them. Once they learn the ropes, it's no more New Jersey.

And despite giving them the pleasure of a call, they won't even QSL. Take the Soviet Union, for example. In this glorious age of *glasnost*, you'd think the Soviets would bend over backward to give a New Jersey boy a QSL to be mounted with pride on a ham-shack wall. No, sir. The Soviets are in league with the New Hampshire guys, refusing to QSL any New Jersey contact. It's sad, but true, and I'm willing to bet my last 40 meter crystal that the CIA has the dope on why the Soviets are being such Scrooges with their QSLs. I'll tell you why as soon as my Freedom of Information request is answered.

In the meantime, we New Jersey hams can do a couple of things to battle this terrible QSL discrimination. First, we can lobby our state legislators to divide the state in two—Northern Jersey and Southern Jersey—thereby increasing the scarcity value of a Jersey contact and subsequent verification.

Second, we can refuse to verify any requests for verification until the international amateur community agrees that all hams, everywhere, QSL all previous requests. Also, there should be a promise to Federal Express QSLs to New Jersey stations immediately (within 60 minutes, say) following completion of any future QSO. The agreement should also call for forfeiture of all Soviet and New Hampshire ham-shack gear should amateurs in those two specific areas refuse any QSL request.

And while the amateur radio brotherhood tackles New Jersey QSL discrimination, it might also approach the sponsors of the Worked All States Award to say if they're hell bent on requiring verifications from 50 states, they should mount regular DXpeditions to Vermont, Delaware, and Rhode Island, if those states do indeed still exist. CQ

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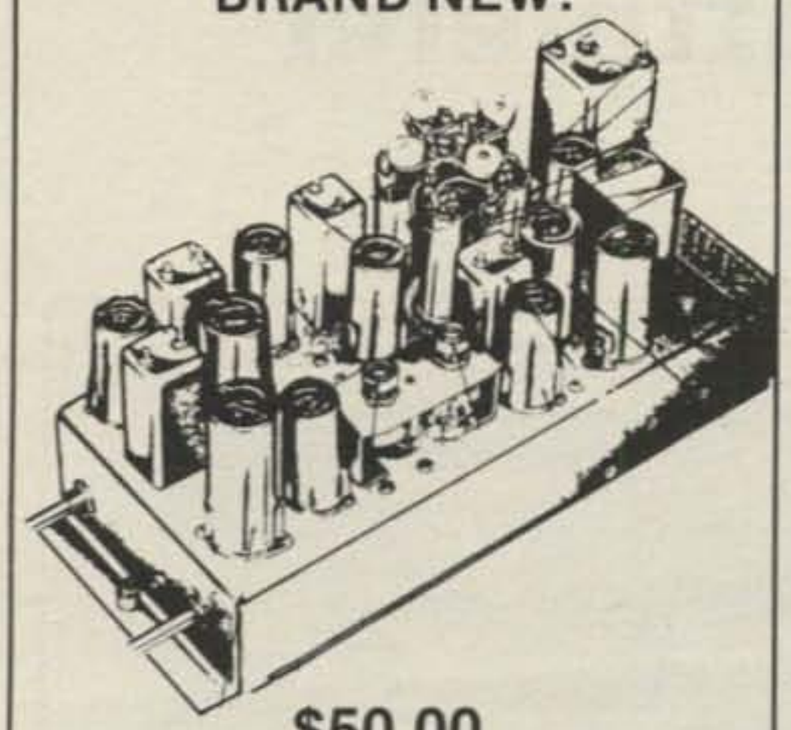

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CQ REVIEWS:

The Santec W720 Wattmeter

BY LEW McCOY*, W1ICP

The Santec W720 wattmeter.

The Santec W720 wattmeter is one of those devices which when you see it, you say, "Why didn't someone think of making this years ago?" Why? Quite simple. Most amateurs run transceivers barefoot, 100 watts or so. And a great number of amateurs operate on 2 meters in addition to the low bands. The W720 is designed to measure average or peak power in three steps, up to 200 watts for all those transceivers, either low-frequency bands or up through 2 meters. Of the three power levels available, there is 60 watts full scale for the medium low-power people, and up to 15 watts for low-power operators. Most important, the unit covers 1.8 to 200 MHz, so it takes in the HTs for 2 meters (or even 220, although it is not rated that high).

The unit measures 2¾" H × 3½" D × 8"W, so it doesn't take up any space worth mentioning. There are two meters, the first having three power scales—0 to 15 watts, 0 to 60 watts, and 0 to 200 watts. The second meter has two scales for reading reflected power or SWR.

There are three toggle switches. The first is for setting to the desired power level. The second, the **MODE** switch, is used to choose average power readings, or to monitor PEP power. The third switch, a three-position job, is for REF power measurements, CAL, and SWR readings.

The stated accuracy of the bridge is ±10 percent of full-scale reading. However, in my tests I found a greater accuracy—less than 5 percent on all scales. In fact, on the low-power range of 15 watts I showed 14 watts, and that difference could be within the discrepancy of my measurements. In order to get enough power for accurate calibration for SWR readings, you need an output of 2 watts to set the meter to the **SET** calibrate mark. I was playing with some 2 meter antennas and found that using the 1 watt output from my HT I could easily get enough reading for adjusting the antennas for a match.

I also have some 220 MHz equipment, so I thought I might check out the unit in that band. Although the rating is to 200 MHz, I could see no reason why it would not do alright at 220. As it turned out, I had a 5 watt output rig and the W720 showed just about 5 watts on its meter. The point is, don't be afraid to use the wattmeter at the higher frequency. Also, I checked it on this band against a 50 ohm dummy load and it showed a match. I have a 2:1 mismatch load, and likewise the meter showed a 2:1 mismatch, so I was satisfied that the unit I tested did work at 220.

Some amateurs are concerned about insertion loss of any devices in the feed line. In this case the W720 had an insertion loss of 0.2 dB, which is insignificant.

The circuit is standard in that it uses the Bruene-type power bridge that was popularized by Doug DeMaw, W1FB, in his many articles. This type of bridge is not frequency sensitive, or at least not nearly as much as some reflectometers.

As to my personal observations, as I stated at the outset, the W720 is a unit that can fill many needs for the average amateur. Santec also makes two other models similar in appearance to the W720. One is the W710, which covers 1.8 through 60 MHz and has three power scales—20/200/2 KW. The other unit is the W740, which has a maximum power of 200 watts in three scales similar to the W720, but covers 140 through 525 MHz.

The W720 is priced at $119.95 and is distributed by ENCOMM, Suite #105, 1104 Summit Ave., Plano, TX 75074. CQ

Technical Editor, CQ, 200 Idaho St., Silver City, NM 88061

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CIRCLE 16 ON READER SERVICE CARD

No - 45 - 46

CQ REVIEWS:

Heath Computer-Based License Preparation Courses

BY PETER R. O'DELL*, WB2D

Although the Volunteer Examination System is in many ways far better than the old system, there are some aspects that are abysmal. For instance, sit down with the question pools sometime and read through them. The language-skill level required to comprehend what is being asked is often college or higher. Please understand that I am not talking about the question content, as that's another story. The number of words in the sentence, the average number of syllables, and the complexity of the sentence structure are where the difficulty lies. In other words, for many of the exam questions you would have to turn to a college exam to find *wording* equally complex. Fortunately, the Heath software system offers one means to overcome some of the unnatural roadblocks.

After my wife, Sally, got her Extra back in 1978, I had little reason to pay much attention to the exams. Then a couple of years ago Anita, our daughter, started working on her Novice. In spite of the typical boredom of a nine-year-old, Anita managed to absorb enough information to pass the Novice test. Last winter Anita decided to work on the Tech. She attended an upgrade class here and digested a lot of the material. The first time she took the Technician exam, she didn't make it. I was a little surprised, because I was sure that she knew enough of the material to pass. It wasn't the material that gave her problems; it was the language skills required to understand the questions.

One of the things that we had done when she was working on her Novice was to make up flash cards. I photocopied all the questions. Anita cut them out, pasted them on old QSL cards, looked up the answers, and wrote them on the backs of the cards. It was a lot of work, but the instant feedback that she got while flipping through the cards seemed to help her a lot.

We were ready to try the same thing with the Technician questions when I noticed something even better at a hamfest Heathkit booth. It was a 5¼ inch disk for an IBM-compatible computer that has all the questions and answers from a particular question pool on it. The program offers the user several options of what to do with the questions.

By far, the most useful option for Anita was to generate sample exams. The program randomly selects the appropriate number of questions from each sub-element. One at a time, the questions are put on the computer screen. You then select the answer from the four possible ones offered and press the corresponding key on the computer keyboard.

What happens next depends on whether or not you selected the correct answer. If you are correct, you get the "good" beep from the computer, an encouraging message like "That's right!", statistical information on how you're doing this session, and, finally, the next question. If your answer is not the correct one, you get the "other" beep and a message encouraging you to try again. Getting the right answer is highly encouraged, to say the least.

Another interesting feature of the program is the ability to isolate the questions from the various subsections of each pool. For instance, suppose that you are having difficulty with questions related to rules and regulations (Piker! You mean you haven't finished law school yet?). You can set up the program so that it will give you only those questions from the R&R subsection. It is a very versatile program that can easily be "customized" for any difficulty you might have with the theory portion of the exam.

Some of you may be wondering if it is "ethical" or "right" to use what amounts to a memorization technique for passing the exam. It is absolutely okay to do this. First of all, go back and look at the arguments used to support the VE proposal. Basically, it ran, "If you can memorize enough to answer a sampling of 500 questions, you've learned more than enough to qualify for a license." Second, as I pointed out above, the exams primarily test your language skills, with little relevance to real-world situations. My advice is to use whatever techniques you can to memorize enough to pass the exams. You'll soon learn the important stuff after you get on the air or try a new facet of the hobby.

Anita found it to be just the ticket for upgrading. It was fun and entertaining, as well as providing her with the instant feedback that she needed to wade through the drivel in the test questions. Additionally, there is a very versatile Morse code program on the disk which allows several different approaches to working with code.

Diamond Systems produces the programs for Heath. It appears that it is the same as the program they sell under their own label.

There is one disk for each license level, and they are standard IBM-type 360k 5¼ inch disks. You'll have to have a 5¼ inch drive as your "A" drive (or play around with DOS's Assign function). The disks are copy protected. Since they are text based, the programs should work with any display adapter and monitor. The price for each disk varies from $35 to $50 depending on the size of the question pool. CQ

*Associate Editor, CQ; CompuServe 76440,271

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"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Headsets

Headsets usually are a pair of matched headphones (miniature speakers) held in position (over your ears) by a headband, and complete with a cord for interconnection to equipment. There are headsets which just have one headphone, and there are also headsets which include boom-mounted microphones. There are many types of headsets, including transducer-type (air column) earphones, which are not suitable for use wherever they would be used by several operators.

There are three major reasons why an amateur should use a headset instead of a loudspeaker. The most important reason to use a headset is because it doubles your ability to hear very weak signals. Second, headset use provides isolation from noises which may be present in your shack, which further improves the operator's ability to hear weak signals. Last (but not least), headset use makes your amateur radio operation much more acceptable to other people in your home. No matter how good received signals may sound to you, they are usually just irritating noise to the nonamateurs who are within hearing range of your loudspeaker. Using a headset can make your amateur radio operation much more acceptable to your family.

Compromise

Each operator must decide which headset is most suitable in fulfilling her/his needs. The more sensitive headphones are heavier than the less sensitive ones. One operator may decide that the increased weight of a very sensitive headset is acceptable, whereas another operator may be willing to sacrifice some sensitivity to have a lighter headset. Price is another matter that must be considered. You may decide to sacrifice some performance by purchasing a lower priced headset that is satisfactory for your requirements. Simply stated, there are some headsets available at about $20 which compare quite favorably to headsets selling at around $100. Increased performance may not be worth a much higher price to many amateurs.

Dual Versus Single Earphone Headsets

The single (one ear) headphone headsets are lighter and less expensive than the dual (both ears) headphone headsets. If you decide to use a single headphone headset, it is advisable to determine which of your ears is most sensitive, so that you will know which ear to use with the headphone. Most people have about two decibels better hearing (at 1 kHz) with one ear, as compared to their other ear. The "good" ear is usually about 6 decibels (dB) better at 10 kHz. You may already know

2814 Empire Ave., Burbank, CA 91504

Here are Joanne, KB9BMD, and Jennifer, KB9BHR, Gustafson of Orion, Illinois. They are the 16-year-old granddaughters of Mary, KA9WAG, and Leslie, NO9X, Conrad. These twins are shown in the Conrad's shack.

which one of your ears is most sensitive. You probably automatically turn that ear towards weaker sounds of interest, without realizing that you do so. Your family members should be able to tell you which ear you favor. If you are going to purchase a single headphone headset with a boom-mounted microphone, make sure the mike boom is oriented as you want it to be. Some headsets are designed to permit boom mikes to be mounted either way to accommodate the operator's needs.

The dual headphone headset provides operators with the capability of hearing signals which are 2 to 3 dB lower than the signals which can be heard when using a single headphone headset. In addition, human hearing tends to cancel out noise which is presented to both ears at the same level. However, some of this noise cancellation is lost due to the fact that most of us have unequal sensitivity with our ears. In any case, a dual headphone headset provides better hearing capability than a comparable (equal quality) single headphone headset.

Frequency Range

We do not want headphones or microphones with high-fidelity (50 to 15,000 Hz) characteristics. The 300 to 3000 Hz range is all we need for amateur radio communication. There are many excellent headsets which meet our communication needs very well. Some have upper frequency limits (4000 to 8000 Hz) that are higher than we want, but they are still acceptable.

Once we reach the mid-twenties, our hearing starts to deteriorate. High (10 to 15 kHz) frequency hearing capability degrades much faster than our ability to hear low (50 to 500 Hz) frequencies. During their lives men usually suffer about twice as much hearing loss as women. This natural hearing loss makes it more important for older amateurs to use headsets.

Most people hear a frequency of approximately 2000 Hz best from youth to old age. Consequently, sounds near 2 kHz are somewhat annoying to us. When operating code, do not tune a received signal to produce a low melodic tone, because such tones are not as easy to detect as higher ones. Most operators tune receivers to produce a code signal tone close to 700 Hz, which is why modern transceivers are designed with that automatic offset between the receive and transmit frequencies. If you experience difficulty copying a weak signal buried in noise (QRN) and man-made interference (QRM), tune to a slightly higher pitch that is more distinctive and is easier to detect. Aggrevating high-pitched tones are easier to hear than soothing, low melodic tones.

Impedance

Most of the modern transceivers are designed to be used with low-impedance earphones, usually in the 4 to 20 ohm range. Using headphones with the correct (matching) impedance provides maximum undistorted signal reproduction. Earphones are available in a wide range (about 4 to 2000 ohms) of input impedances. If your receiver's headphone impedance is high, there are high-impedance earphones you can buy. Small audio transformers are also available for use in matching impedances. As an example, Fair Radio Sales Company (P.O. Box 1105, Lima, OH 45802) sells a 2 watt, 600-to-8 ohms audio transformer (T1/LS166) at less than $10. Astrocom Electronics (P.O. Box 370, Oneonta, NY 13820) sells 5-to-150, 600-to-7.5, and 1200-to-15 ohm in-line impedance matching transformers. These transformers are available from many companies.

Some receiver audio output stages (usually the audio output transformer) are subject to damage if the load (loudspeaker or earphones) is removed. This problem is primarily related to older (tube-type) equipment. However, it is not advisable to leave an open (defective) headset plugged into the headphone jack, since that results in no load across the output of the final audio amplifier. This is usually the case, because plugging in a headset jack disconnects the loudspeaker with most equipment.

High Noise

Earphones assure improved reception of signals (as compared to loudspeakers) when high noise levels exist in your shack or on the band you are operating. A good dual earmuff headset effectively isolates the operator from noise generated in (and around) the home. Such noises might otherwise make it difficult for us to hear desired signals. If nothing else, household noise could distract us and cause

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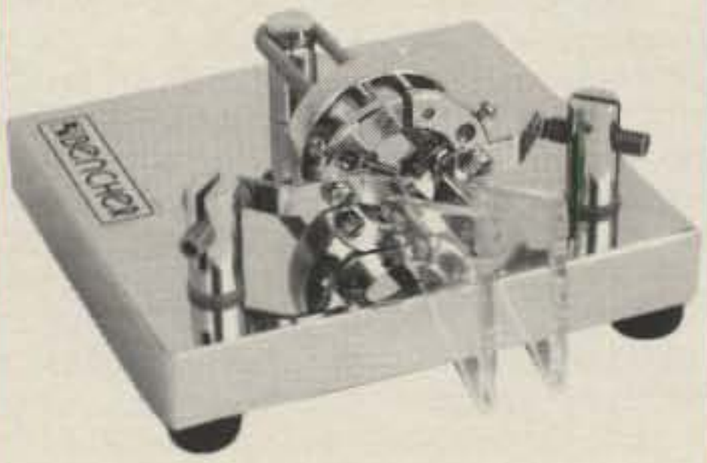

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us to not pay close attention to received signals.

As they are manufactured, both earphones are wired in phase, which means the positive (compression) and negative (rarefaction) pressures are applied to both ears simultaneously. The ability to hear a weak signal (buried in noise) can be improved about 30% by reversing the leads at one (not both) earphone of a dual-earphone headset. Our hearing system automatically cancels noise that is presented out of phase to both ears. This improvement is not noticeable when listening to a strong signal on a quiet band.

If band conditions are extremely noisy, you can eliminate most of the noise by wearing a contoured pair of earplugs under your headphones. Signals will be heard reasonably well, whereas most of the noise will seem to disappear. Use fitted earplugs to avoid discomfort and the reduced effectiveness which are associated with poorly fitted earplugs.

Laboratory experiments have revealed facts that may be of interest to some readers. Those factors are mentioned herein for the benefit of experimenters.

If the input to one earphone is delayed about 500 microseconds behind the input to the other earphone (of a dual-earphone headset), the operator gains about a 5% increase in the intelligibility of a weak signal on a noisy band.

If noise is applied out of phase to both earphones while the desired signal is applied to one earphone, the signal dominates one's hearing, causing the noise to seem to disappear. Under these conditions the signal seems to come from inside the operator's head, whereas the noise seems to be external, and it is easily ignored.

If noise is applied out of phase to both earphones, while the desired signal is applied in phase to both earphones, the operator's ability to hear weak signals buried in noise is significantly improved.

Earmuffs

It is beneficial to use earphones with earmuffs. Earmuffs minimize the possibility that an operator will be distracted by noises in the area of the shack. Earmuffs trap the desired signal energy where it is applied to the operator's hearing system. Perspiration causes earmuffs to eventually become rigid, so it is a good idea to wipe them dry when you finish operating. Rigidity degrades the high-frequency response characteristic of earphones. In addition, rigidity allows some of the desired signal energy to leak out, and it allows undesired household noise to leak in, degrading reception capability.

Earmuffs should be thick, flexible, and comfortable. Earmuff pressure against the operator's head must be sufficient to prevent sound/noise leakage, but it must not be so much that it causes operator discomfort. Many of the better headsets have adjustable headbands, which allow operators to establish the amount of pressure they want. A loose head set results in signal-reception degradation, whereas an overly tight headset results in operator discomfort that can escalate to pain within about one hour. Most of the headset manufacturers offer replacement earmuffs. Since earphones are quite standard in size and shape, earmuffs are usually interchangeable.

Temporary Threshold Shift

High audio energy levels cause humans to suffer a hearing loss that is called temporary threshold shift (TTS). TTS acts like a human automatic gain control (AGC) which reduces the threshold of our hearing level when we have been subjected to loud sounds. TTS can last a few seconds to several hours, depending upon the intensity and duration of the sound that caused the temporary "hard of hearing" condition to develop.

The dynamic range of receiver sections in most modern transceivers is excellent, which means that they can produce suitable audio output over a range of input signals that can vary between extremely weak (½ microvolt, as an example) to very strong. Good dynamic range now allows us to run the radio frequency (sensitivity) gain control at maximum while working code contracts and using the audio (AF) gain control to output signal volume to any desired level. It is a good practice to get in the habit of listening at low signal levels. This minimizes TTS and it allows you to operate with less fatigue. Noise tires operators.

The Boy Scout Jamboree on the Air (JOTA) was held October 15–16, 1988. Glenn Luzzi, WB2WPU, of Mt. Bethel, Pennsylvania submitted this photograph showing Webelos Scouts at his operating position. These Scouts are in Den 4 of Pack 14 of the Minsi Trails Council in Allentown, Pennsylvania. Glenn and his son (Scott, KA3SFZ) let the Scouts work several SSB/voice contacts on the 10 meter Novice band. This picture was taken near the close of the evening's activities, when five of the ten Scouts had already retired to the backyard overnight campsite.

Commercial Headsets

The *Thomas Register* lists manufacturers of products. The current issue lists 30 manufacturers of headsets. My requests for information revealed that seven manufacturers (including RCA and Telex) no longer manufacture headsets. About ten companies sent no response to my letters. I am continuing to update a list of headset manufacturers. If anyone wants a free copy of this list, please enclose an SASE with your request.

RCA is out of the mobile communications equipment manufacturing field, but RAB Parts, Inc. (1 West Pike Street, Canonsburg, PA 15317) is marketing the residue of their material.

Similarly, Telex Communications no longer makes headsets for amateurs, but their excellent headsets are available from EGE, Inc. (14803 Build America Drive, Building B, Woodbridge, VA 22191). The Telex Procom 250 is an excellent headset. Earphone frequency response is 100 to 8000 Hz with a 103 dB sensitivity at 1 kHz. Earphone impedance is low, and the impedance of the boom-mounted electret noise-cancelling microphone is switchable between a high (50,000 ohm) and a low (600 ohm) value. The Telex Procom 450 (8 ohm earphone impedance) and Procom 460 (600 ohm earphone impedance) headsets are suitable for use by operators who prefer to use handheld or desk microphones.

Wholesale Educational Suppliers Company (Box 123, East Haven, CT 06512) offers a series of low-cost headsets which look good per their advertising flyer. Their MX-300AMC dynamic headset sells for approximately $10. The covered headband is adjustable and the ear cushions are foam-filled. The coiled cord terminates with a right-angle standard phone plug. Frequency response is 40 to 12,000 Hz and sensitivity is 108 dB at 1 kHz. This headset weighs 13 ounces. Unless 16 or 2000 ohm impedance is requested, the headset is sold with a 600 ohm impedance. This headset appears to be the lowest cost one that is available with reasonably satisfactory features.

Military

Several companies produce headsets sold to our Armed Forces. Acousticom Corporation (28180 Clay Street, Champlin Industrial Park, Elkhart, IN 46517) is typical of the better manufacturers of military headsets. Their 10094B (H-140B/U, 1000 ohms), 10118 (H-158/AIC, 19 ohms), 10951 (H-158/AIC, 19 ohms), 10954 (H-173C/AIC, 19 ohms), and 10956A (H-251A/U, 1000 ohms) headsets are all double earphone units which sell at about $100. Frequency response is 100 to 3500 Hz for the 1000 ohm headsets, and it is 100 to 5500 Hz for the 19 ohm headsets. Sensitivity is 105 dB at 1 kHz for all of these headsets. Acousticom also produces a line of headsets which include boom-mounted microphones. Some of these composite headsets are their 10884A (334/TSQ-97), 10484 (H-157/AIC), 10950A (H-157A/AIC), 10314B (H-161D/U), 10957A (H-182A/PT), and 10373 (H-325/TTC), which sell in the $125 to $150 price range.

Military-surplus headsets are available from companies such as Fair Radio Sales. A few of the dynamic earphone elements used in these headsets are the H-87B/U (100–7000 Hz, 103 dB, 15 ohms), H-136/AIC (100–4500 Hz, 113 dB, 22.5 ohms), H-143/AIC (100–5500 Hz, 105 dB, 19 ohms), H-269/G (300–3500 Hz, 103 dB, 12–18 ohms), and H-347/AIC (300–6000 Hz, 17–21 ohms). The TA-235/PT magnetic earphone frequency range is 500 to 3200 Hz; its sensitivity is 116 decibels, and its input impedance is 150 ohms. Those earphones are used in many different types of headsets. Impedance and sensitivity values are stated at 1 kHz, and the power rating is always 1 mw.

A few of the military-surplus dual-earphone headsets are listed herein for your information:

H-16/65, 8000 ohms, 65 inch cord with PL-54, for use in high-noise environment, used at $8.

HS-23, 2000 ohms, 53 inch cord with plug,

Say You Saw It In CQ

gray plastic headband, less cushions, used at $9.25.

HS-23 (foreign made), HB-7 brown headband, 18 inch cord with PL-354.

HS-30 (hearing aid type), 350 ohms, 7.5 inch cord with spade lugs, uses CD-604 or CD-605 matching extension cord.

HS-33, 600 ohms, HB-7 headband, 18 inch cord with PL-354, HB-7 headband, MC-162 2.5 inch rubber cushions, 2 pounds, unused at $19.95.

H-63, 600 ohms, plus M-51 carbon microphone, 3 pounds, used at $9.95.

H-88, 600 ohms, blue-vinyl cushions, 48 inch cord with phone plug, $4.95.

H-113, 600 ohms, 18 inch cord with PL-54, 3 pounds, used at $5.95. Matching 65 inch extension cord, used at $2.00.

HS-GIC/RRE, 1000 ohms, 15 foot cord with mini-jack, 3 pounds, unused at $12.95.

Headset accessories are common to several headsets, since earphone size is quite standard. Some of these items are:

CD-307, 65 inch extension cord, fits HB-7 headband, $2.00.

CD-604, 72 inch extension cord with PL-54, 500 to 4000 ohm transformer, unused at $1.00.

CD-605, 30 inch extension cord with PL-55, 500 to 4000 ohm transformer, used at $2.00.

HB-7 headband, brown, 18 inch cord, $3.00.

HB-7G headband, gray, 54 inch cord, $3.25 used.

MX-41 rubber cushions 2.8 inch diameter, $1.25 per pair.

MC-162 rubber cushions 2.5 inch diameter, $1.00 per pair.

M-301 chamois cushions 4 inch diameter, $5.00 per pair.

The listed prices are from a recent catalog. They are just included to give you a rough estimate of what you might expect to pay to purchase such items. Packing and shipping charges are extra, of course.

Bob Heil, K9EID, is an audio expert who manufactures a superb line of headsets (he calls them boomsets) which are specifically designed for use by amateur radio operators. Most microphones are designed to meet broadcast and/or public-address system requirements. Our amateur radio needs are for limited frequency range microphones. Our SSB/voice range is no more than 300 to 3000 Hz, and communication capability is improved by cutting off part of the low-frequency portion, which minimizes power wasted generating inarticulate bass emissions. The Heil HC-5 microphone element has a sharp roll-off below 350 Hz and above 3100 Hz; it is optimized at 2400 Hz. The Heil HC-4 microphone element has a sharp roll-off below 500 Hz and above 3000 Hz; it is optimized at 2000 Hz. Since 2000 Hz is an optimum hearing frequency for most people throughout their lives, these microphones produce outputs that are extremely efficient for communications.

My wife (Marie, W6JEP) and I have tried boomsets with both types of microphone elements. She likes the slightly broader frequency characteristic of the HC-5, whereas I prefer the reduced range of the HC-4 element. The mike boom can be adjusted to suit individual operators, and it is easily removed when you want to just use the earphones. The earphones are separately adjustable and removable, and the diaphragm is the diameter of the average ear. The foam pads and light weight (8 ounces) of these boomsets make them comfortable to wear during long periods of operation. Most of us have experienced severe discomfort from wearing other headsets many hours. Boomsets were used with great success by DXpeditions, such as the ones to Clipperton (1985) and Navassa. Boomsets have 7 foot cords and they are very rugged. If you wish to improve your communication results, while retaining a microphone you own, you can do so by replacing its microphone element with a Heil HC-4 or HC-5 element. The Heil EQ300 equalizer can also be used to improve the crispness of your voice transmissions. If this paragraph causes you to believe that the Heil boomsets impress me, your assumption is correct. I had five headsets in our shack; now there is one. Heil Limited's mailing address is 2 Heil Drive, Marissa, IL 62257 (telephone 618-295-3000).

Most amateur radio equipment manufacturers offer headsets and microphones as accessories to be used with their transceivers. I asked every company to provide technical information about their earphones and microphones. I did not receive the requested data from any manufacturer; consequently, I cannot include such information in this article. If any reader has technical data regarding such earphones and/or microphones, I would like to receive it. With regard to earphones, I want to know their frequency response range, sensitivity at 1 kHz (1 milliwatt RMS), impedance at 1 kHz, and weight. With regard to microphones, I want to know their frequency response curve, sensitivity, impedance at 1 kHz, type (dynamic, carbon, etc.), and weight.

Personal Preference

As previously stated, each amateur should evaluate headsets to select the one that best suits her/his needs. If your amateur radio friends will permit you to do so, borrow a variety of headsets and evaluate them at your home. If they do not want you to borrow their headsets, try them out at your fellow amateurs' homes.

Summary

A good headset is an important accessory in any amateur radio station. It improves your ability to copy weak signals. Equally important, the use of a headset makes your station operation a lot less objectionable to the other people sharing your home. Even the rarest DX is just noise to most nonamateurs. Headset use can enable you to enjoy a solid contact with a very weak station that you might not be able to work while using a loudspeaker. If you do not have a headset, your family would probably be very happy to get whatever you want, if you will just promise to plug it in and quit using that loudspeaker!

Printed Aids

Previous Novice columns contain information that is useful to new and aspiring amateurs. Many of these items have been reprinted for distribution to students of licensing courses I instruct. For ease of use, these printed aids have been separated into six categories. These categories are introduction, code, theory, station, operating, and miscellaneous. Outdated items are continually replaced with newer material. Fifteen dollars brings a complete set of current printed aids, including shipping costs. A list of these printed aids will be sent to anyone who requests it and sends a business size (#10) SASE to my California address. Licensing-course instructors are welcome to revise and/or duplicate these items to suit their requirements.

73, Bill, W6DDB

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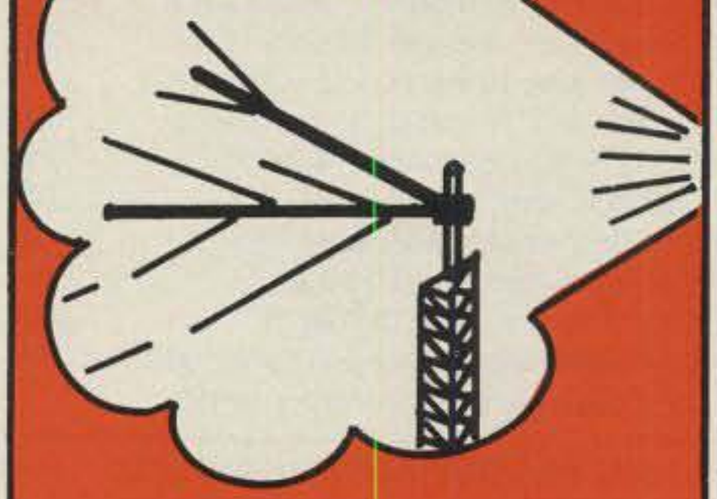

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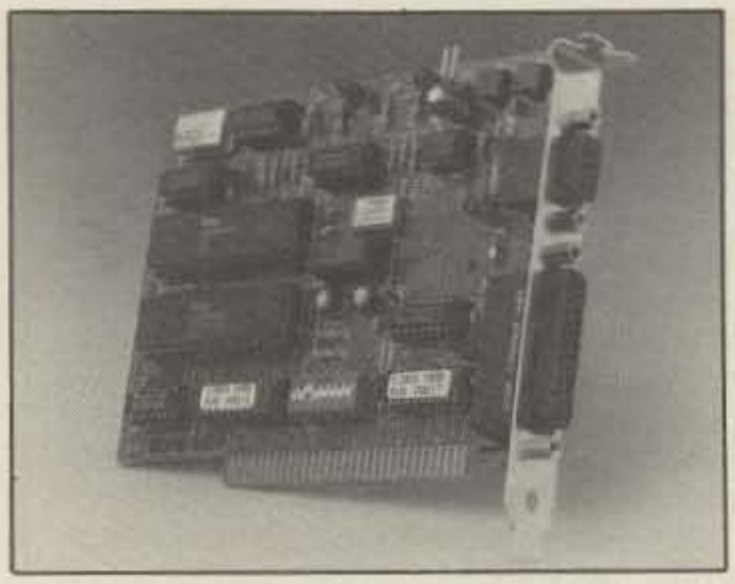

DRSI PC*Packet Adapter System

Digital Radio Systems' PC*Packet Adapter System is a half-inch plug-in adapter card for the IBM PC/XT/AT and compatible computers which gives the PC the capabilities of two traditional stand-alone TNCs at about half the cost. It is suitable for packet radio, RTTY, and AMTOR applications. The card has an onboard 1200 baud modem for standard VHF/UHF FM operations. This modem connects directly to the radio through a DB-9 connector. The second port may be configured for either RS-232 or TTL level outputs. It connects via RS-232 to the DRSI HF*Modem, providing a complete HF/VHF/UHF packet radio station.

When configured for TTL levels, the second port can connect directly to a high-speed RF modem. PC*Packet's terminal program has "pop-up" menu windows to get you on the air in minutes. The one-page Quick-Start Guide takes the operator step-by-step through installation and operation, plus there is a comprehensive operator's manual to fill in all the details. The PC*Packet Adapter lists for $139.95. For more information, contact Digital Radio Systems, Inc., 2065 Range Road, Clearwater, FL 34625, or circle number 101 on the reader service card.

SSC SSTV Adapter

Software Systems Consulting's FSK SSTV modem contains all the necessary software to turn your IBM computer into an SSTV station. SSC provides SSTV FSK demodulator and modulator, digital signal processing software, image capture utilities, 60-page instruction manual, and tutorial cassette with sample images. You need to provide an IBM PC or compatible computer; 640K bytes memory; CGA, EGA, VGA, or Hercules video card; one serial port; 1 parallel printer port; audio tape recorder; transceiver; and printer (optional).

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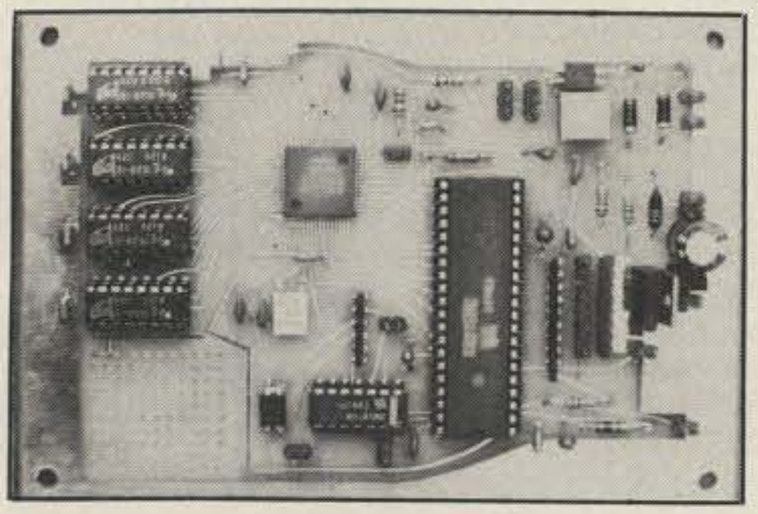

QRZ's Voice Box

QRZ Industries' Voice Box and Mini Voice Box are stand-alone operating accessories designed especially for the DXer. The Voice Box digitizes and stores an operator's own natural voice, and once stored, a voice message can be instantly recalled to call CQ or repeat any other desired phrase. The Voice Box is a solid-state microprocessor-controlled device. A total of eight different phrases and operator voices up to a total of 32 seconds can be recorded. The Voice Box automatically keys the PTT line to your transmitter or transceiver during playback and also allows normal VOX operation. It has a switchable built-in microphone preamp to accommodate a variety of mics.

The Mini Voice Box has all the features of the Voice Box except that it has one voice message channel with up to 8 seconds of message time. As of this writing the Voice Box and Mini Voice Box were being shipped in kit form only, and each kit consists of assembled, tested, working boards with instructions for installing the board in a suitable enclosure. Some standard off-board components (pushbuttons, toggle switches, mic, etc.) are required to complete a unit and are available as options. Also as of this writing boards are being shipped without memory. Four plug-in 41256 (any speed) RAM chips are required (one for the Mini Voice Box). Price of the Voice Box kit is $95. The Mini is $55. The optional off-board components is $20 for the Voice Box and $10 for the Mini Voice Box. For more information, contact QRZ Industries, P.O. Box 160, Piedmont, SC 29673, or circle number 103 on the reader service card.

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A new KISS interface makes the MFJ-1278 TCP/IP compatible.

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Automatic sync and stop lets you set it and leave it for no hassle printing.

You can save FAX pictures and WEFAX maps to disk if your terminal program lets you save ASCII files to disk.

Pictures and maps can be saved to disk or *printed to screen in real time or from disk if you have an IBM or Macintosh* with the MFJ Starter Pack.

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The MFJ-1278 introduces you to the exciting world of slow scan TV.

You can print slow scan TV pictures on any IBM or Epson graphics compatible printer. If you have an IBM or Macintosh you can print to screen and save to disk with the MFJ Starter Pack.

You can transmit slow scan pictures right off disk. If your terminal program lets you save ASCII files you can save pictures from over-the-air QSOs.

You can transmit and receive 8.5, 12, 17, 24, and 36 second black and white format SSTV pictures using two levels.

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***Nothing** beats the quick response of a memory keyer during a heated contest.*

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Message memories let you store contest call, name, QTH, rig info -- everything you used to repeat over and over.

You get iambic operation, automatic incrementing serial numbering, weight control to penetrate QRM and more.

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Turn on your MFJ-1278 and it sets itself to match your computer baud rate. Select your operating mode and the correct modem is automatically selected.

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A new KISS/AMTOR/Navtex Firmware update is available to MFJ-1278 owners.

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The keyer mounts on a Bencher paddle to form a small (4 1/8 x 2 5/8 x 5½ inches) attractive combination that is a pleasure to look at and use.

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You can buy just the keyer assembly, MFJ-422BX, for only $79.95 to mount on **your** Bencher paddle.

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MFJ-931 **$79.95**

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MFJ-1024 **$129.95**

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$34.95 MFJ-1701

$21.95 MFJ-1702

New **$59.95** MFJ-1704

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MFJ has a full line of dummy loads to suit your needs. Use a dummy load for tuning to reduce needless (and illegal) QRM and save your finals.
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CQ World-Wide WPX SSB Contest All-Time Records

BY STEVE BOLIA, N8BJQ, DIRECTOR, CQ WPX CONTEST

The contest is held each year on the last full weekend of March. The All-Time Records will be updated and published annually. Data following the calls are year of operation, total score, and number of prefix multipliers.

WORLD RECORD HOLDERS

Single Operator

1.8	CG3MFA('85)	319,140	162
3.5	OH1RY/CT3('85)	2,816,754	453
7.0	NP4A('86)	6,668,184	654
14	ZZ5EG('88)	8,219,627	871
21	ZZ5EG('86)	9,794,448	816
28	ZY5EG('88)	7,372,512	736
AB	PJ2FR('86)	13,040,435	823
QRP/p	K7SS/WH6('86)	2,078,490	395

Multi-Operator Single Xmtr.

PJ2FR('87)	18,493,730	907

Multi-Operator Multi-Xmtr.

ZZ5EG('87)	38,096,250	1250

U.S.A. RECORD HOLDERS

Single Operator

1.8	K5UR('85)	122,664	228
3.5	KQ2M('85)	1,247,906	433
7.0	KM6B('87)	1,164,800	320
14	K2VV('87)	3,546,294	687
21	AI7B('82)	4,151,232	576
28	N5AU('82)	3,094,249	571
AB	KM1H('87)	4,547,067	739
QRPp	W8ILC('82)	1,044,012	459

Multi-Operator Single Xmtr.

N5AU('84)	6,301,977	759

Multi-Operator Multi-Xmtr.

AI6V('81)	12,529,608	728

CLUB RECORD

North Texas Contest Club('84) 53,012,561

QRPp RECORD

K7SS/WH6('86) 2,078,490

WPX (Prefix) RECORD

ZZ5EG('87) 1,250

CONTINENTAL RECORD HOLDERS

AFRICA

1.8	OH1RY/CT3('87)	290,140	163
3.5	OH1RY/CT3('85)	2,816,754	453
7.0	OH2KI/CT3('87)	3,729,834	409
14	TU4BR('86)	3,483,480	637
21	EL2AV('81)	4,617,530	557
28	CN8CY('82)	2,947,811	487
AB	EA9AM('87)	12,712,460	838

ASIA

1.8	5B4LP('86)	142,272	117
3.5	5B4LP('84)	763,458	222
7.0	H24LP('87)	5,348,975	503
14	C44LP('85)	2,467,900	460
21	4XØU('81)	2,823,916	514
28	4X4UH('80)	2,718,760	440
AB	4X7DX('87)	4,932,744	564

EUROPE

1.8	LZ2BE('84)	261,504	144
3.5	PA2TMS('87)	892,738	341
7.0	OH2KI/ZB2('85)	1,954,210	365
14	YT3AA('87)	3,928,015	679
21	OHØBH('83)	3,977,685	501
28	YU3MY('80)	3,530,016	412
AB	Y24UK('82)	6,285,436	586

Multi-Operator Single Xmtr.

AF	OH8PF/EA8('86)	9,898,245	735
AS	UK9AAN('80)	11,152,020	660
EU	9A1ONU('80)	13,362,486	723
NA	VP2EC('83)	15,238,880	820
OC	KD7P/NH4('85)	10,484,712	568
SA	PJ2FR('87)	18,493,730	907

NORTH AMERICA

1.8	CG3MFA('85)	319,140	162
3.5	VE3BMV('86)	1,928,720	388
7.0	NP4A('86)	6,668,184	654
14	TI2CC('87)	5,491,290	790
21	TI1T('87)	4,218,904	628
28	FGØDYM/FS7('80)	3,304,752	484
AB	VP2ML('88)	7,589,153	803

OCEANIA

1.8	T32AF('83)	16,872	37
3.5	AH6AZ('88)	492,030	231
7.0	T32AF('84)	2,991,352	364
14	VR3AH('79)	3,526,153	437
21	VK4QK('80)	2,592,216	396
28	KB7IJ/KH2('82)	4,743,144	504
AB	AI6V/NH6('85)	6,677,500	500

SOUTH AMERICA

1.8	YV5JEA('84)	40,320	63
3.5	4M3AZC('84)	1,158,132	309
7.0	YV6CAX('86)	2,062,800	382
14	ZZ5EG('88)	8,219,627	871
21	ZZ5EG('86)	9,794,448	816
28	ZY5EG('88)	7,372,512	736
AB	PJ2FR('86)	13,040,435	823

Multi-Operator Multi-Xmtr.

AF	9E3USA('69)	2,398,192	296
AS	UK9AAN('78)	10,702,776	532
EU	YZ1EXY('84)	14,503,141	881
NA	VP2EC('87)	37,446,109	1147
OC	KH6XX('88)	24,959,649	949
SA	ZZ5EG('87)	38,096,250	1250

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IC-725 New Ultra-Compact Xcvr	949.00	Call $
IC-575A 10m/6m Xcvr	1399.00	Call $
Receivers		
IC-R7000 25-1300 + MHz Rcvr	1199.00	Call $
IC-R71A 100 kHz-30 MHz Rcvr	999.00	Call $
VHF		
IC-228A New 25w Mobile	509.00	Call $
IC-228H New 45w Mobile	539.00	Call $
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IC-275H All Mode Base 100w	1399.00	Call $
IC-28A FM Mobile 25w	469.00	Call $
IC-28H FM Mobile 45w	499.00	Call $
IC-2GAT, New 7w HT	429.95	Call $
IC-02AT FM HT, HP	409.00	Call $
IC-900 Six Band Mobile	639.00	Call $
UHF		
IC-475A All Mode 25w	1399.00	Call $
IC-475H All Mode 75w	1599.00	Call $
IC-48A FM Mobile 25w	509.00	Call $
IC-4GAT, New 6w HT	449.95	Call $
IC-4AT FM HT	349.00	Call $
IC-04AT FM HT	449.00	Call $
IC-448A, 25w Mobile	TBA	Call $
IC-3200A FM 2m/70cm 25w	649.00	Call $
IC-32AT Dual Band Handheld	629.95	Call $
IC-3210 Dual Band Mobile	739.00	Call $
220 MHZ		
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IC-38A 25w FM Xcvr	489.00	Call $
IC-37A FM Mobile 25w	499.00	Call $
IC-3AT FM HT	349.00	Call $
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TH-25AT 5w Pocket HT NEW	369.95	Call $
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UHF		
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TM-421A Compact FM 35w	469.95	Call $
TH-415A 2.5w 440 HT	419.95	Call $
TH-45AT 5w Pocket HT NEW	389.95	Call $
TH-55 AT 1.2 GHz HT	524.95	Call $
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220 MHZ		
TM-3530A FM 220 MHz 25w	519.95	Call $
TH-31BT FM, 220 MHz HT	299.95	Call $
TM-321A Compact 25w Mobile	469.95	Call $
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UHF		
FT-712RH, 70cm, 35w mobile	499.95	Call $
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FT-790R MKII FM/SSB, 25w	799.95	Call $
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FEX-736-1.2 1.2 GHz, 10w Module	539.95	Call $
FT-690R MKII, 6m, All Mode, port.	569.95	Call $
Dual Bander		
FT-727R 2m/70 cm HT	439.95	Call $
FT-4700RH, 2m/440 Mobile	889.00	Call $
220 MHZ		
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CIRCLE 149 ON READER SERVICE CARD

Antennas & Accessories

a monthly feature by
KARL T. THURBER, JR., W8FX

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

Reader Forum—Part III

One of the nicest benefits of doing this column for *CQ* is reading the mail from you, our readers, without whom this column wouldn't have a reason to exist. Fortunately for us, the letters just keep piling in! This time we'll again dig into the mailbag for further discussion of the Extended Double Zepp (EDZ) antenna and the "Modified Windom." We'll also update you on some new software offerings and save some room for a couple of "short bursts" before closing out the column. First, let's summarize some of the letters we've received.

Reader Forum

More on the EDZ. We've run material on the Extended Double Zepp (EDZ) antenna in several previous columns, most recently in the March 1987 and July 1988 issues. To bring the EDZ into focus, it can be considered to be a "special case" of the two-element collinear, which normally has a gain of about 2 dB compared to an ordinary half-wavelength dipole. By making the antenna a little longer, 0.64 wavelength on a leg, the EDZ exhibits a gain of about 3 dB over the dipole. Basic EDZ construction details are as shown in fig. 1.

There have been a number of misconceptions about the EDZ, especially in terms of its feedpoint impedance, the need for a certain feedline length, the radiation pattern, and the "requirement" for a certain type of transmatch or other matching device. In last July's column we published some information on the EDZ that unfortunately reinforced these misunderstandings. Let's clear them up now.

First, the feedpoint impedance of the EDZ is more on the order of 126 ohms or thereabouts, on the band for which it is cut, not 450 ohms as we suggested in the article. Actually, we might have correctly stated that the resultant "match" to 450 ohm line really isn't too bad from a loss standpoint if 450 ohm openwire line or ladderline is used.

Second, we implied that to obtain the maximum current distribution across the antenna, the feedline must contain a half-wavelength portion between the first high-current portion and the tuner. This isn't the case, in that the current distribution on the antenna is determined solely by antenna length and diameter, and is independent of feedline characteristics. So, as long as the antenna tuner is properly adjusted, the power is going to be transferred to the antenna regardless of feedline length. Needless to say, the feedline doesn't affect the antenna's radiation pattern at all, so perhaps the best statement one can make about what the right feedline length one should use would be that it should be just long enough to reach from the transmitter to the antenna—no more, no less!

Another point concerning gain in the EDZ illustrates the tradeoffs involved when an antenna is designed for "gain": The EDZ *does* have a 3 dB gain relative to the dipole, but this 3 dB broadside gain results from significant narrowing of the antenna's major lobe; thus, the gain it isn't completely "free." As the gain is increased, the antenna's general coverage area is decreased correspondingly. The bottom line is that many amateurs believe that the gain achieved by longwire antennas such as the EDZ is achieved over the whole broad half-wave dipole lobe area, not realizing that they have a smaller beamwidth than with the half-wave dipole, and that longwires are not easy critters to rotate! Wrapping the EDZ into a Vee-type configuration wouldn't increase gain by making the antenna less directional broadside; if anything, the gain would be reduced.

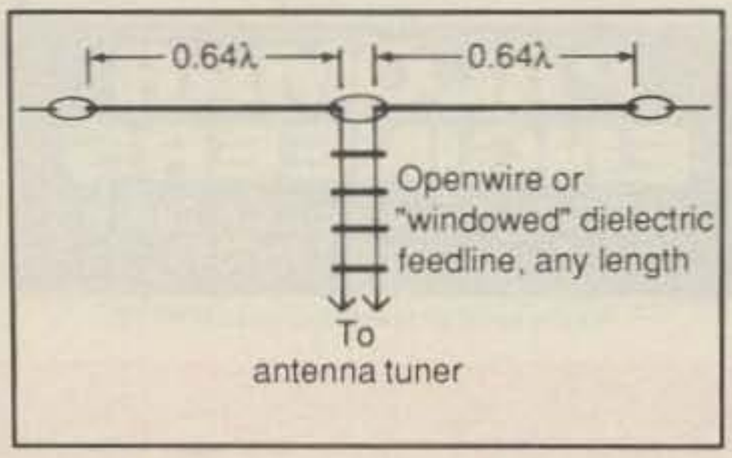

Fig. 1– The Extended Double Zepp (EDZ) is constructed using two legs 0.64 wavelength on a leg, and it exhibits a gain of about 3 dB on the band for which it is designed. Construction details are the same as for other parallel-line-fed antennas. Note, however, that the EDZ is a relatively long antenna, so check your available space—for example, a 20 meter EDZ requires about an 87 foot flattop.

Finally, on antenna tuners and transmatches: The myth seems to have grown up around the EDZ and various Zepp-type antennas that without a classic "coil and condenser" tuner like the venerable old Johnson Matchbox, this type of antenna is going to work quite poorly. While the Matchbox *is* an excellent tuner for handling balanced lines, and it can handle loads from about 40 to 1000 ohms, it's not the only type of tuner that can do the job. Many different types of tuners, including designs such as the Ultimate Transmatch and various balun transformer types, can be counted on to do the job right. While some amateurs have had some problems with heating with some ferrite-transformer/balun designs under certain conditions, if one gets the power into the antenna, that's what counts—not the label on the antenna tuner.

A tip of the hat is due to Walt Maxwell, W2DU; Lew McCoy, W1ICP; Ciano R. E. Strachan, C6ANI; and Fred W. Krohberger, W2DUN; for contributing their technical comments and observations on the EDZ.

Modified Windom. Otis A. Nunn, KJ4RT, dropped us a line to tell us that he had constructed the Modified Windom as shown in our January 1984 column. Writes Otis:

"I built the antenna just as shown. The only difference is that I installed it as an inverted Vee instead of as a [straight] flattop. I use the antenna on all bands, including WARC and MARS; the only place that I have found that it doesn't seem to want to tune to very well is below 3.5 MHz.

"My rig is an ICOM 735 with the AT-500 tuner. Running 90 watts PEP, I have gotten some good DX results with this setup. I must say that I had some reservations about this antenna and was even told by one [amateur] that it would not work, but was I ever in for a surprise. I can truthfully say that this is the best all-around wire antenna I have ever used."

Thanks, Otis, though there's nothing magical in this antenna, and it isn't even original with me. As we noted in the January 1984 column, it was designed by Bob Grove, WA4PYQ, who published it in *The Monitoring Times* for May-June 1983. It's a fairly standard Windom, its major wrinkle being the addition of a twin-lead matching section to help promote 15 meter band operation. The antenna is as shown in fig. 2.

To review, the Windom is a popular HF design that waxes and wanes in popularity. The design was appropriately named after General Loren G. "Windy" Windom, W8GZ, who developed it and wrote it up for publication in the 1930s. Actually, the original design may be based on something even older than that. For example, Bob Decesari, WA9GDZ/6, reported in his *WorldRadio* column that he found that a prototype Windom-style antenna was first designed in 1929 by John Byrne and Ed Brooke, two amateurs employed at the Bell Telephone Labs. Their design, which used a singlewire-type feedline, appeared in the September 1929 issue of *QST*.

The antenna is simply a half-wave flattop (at the lowest operating frequency) which is fed at a point about 15% from the center with a singlewire feeder of convenient length. However, contemporary versions substitute 300-600 ohm twinlead, openwire line, or ladderline for the singlewire feeder.

The Windom design promotes an acceptable match to parallel conductor feedline on all even harmonically related bands, such as 80, 40, 20, and 10 meters. A typical Windom flattop dimension is about 137 feet, with the feeder tapped at a point 20.5 feet (15%) off-center.

However, the Windom normally doesn't do much for the amateur who wants to operate on 15 meters, since the even harmonic relationship doesn't exist on 15. One solution to enable 15 meter operation is to simply to feed the antenna as a randomwire against ground.

Another and potentially better solution to 15 meter operation was suggested by Bob Grove, WA4PYQ. He was in search of an "all-band" coax-fed dipole for shortwave monitoring purposes, but one which would also give a good account of itself on transmitting, including 15

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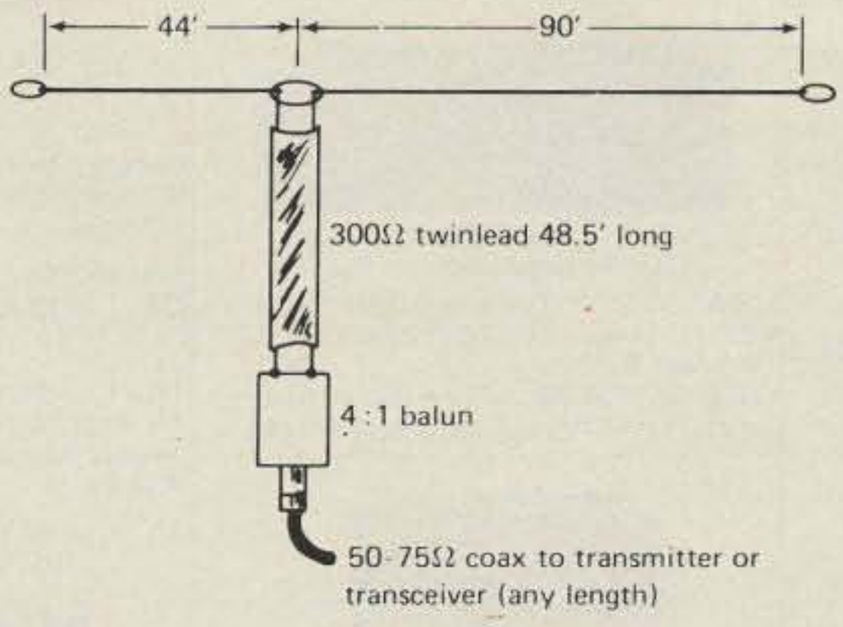

(A) FLATTOP AND FEEDING ARRANGEMENTS

Typical VSWR vs. Frequency (mHz) for grove dipole.

Freq.	1.8	1.9	3.5	3.6	3.7	3.8	3.9	4.0	7.0	7.1	7.2	7.3
VSWR	2.5	2.5	1.3	1.4	1.3	1.3	1.4.	1.3	1.5	1.2	1.1	1.1

Freq.	14.0	14.2	14.3	21.0	21.2	21.4	28.0	28.5	29.0	29.5
VSWR	2.7	2.4	2.0	3.5	1.8	1.2	3.0	1.8	2.5	1.9

(B) SWR PROFILE, BY BAND

Fig. 2– The modified Windom shown here was designed and built by Bob Grove, WA4PYQ, and described in The Monitoring Times *of May–June 1983. It is designed to give a good account of itself on 80, 40, 20, 15, and 10 meters, with 160 tossed in as a bonus. See the text for details.*

meters. Bob did a good deal of pruning and on-the-air testing, and he came up with the fig. 2 design. As can be seen from the diagram, it makes use of a 134 foot flattop which is fed through a short length of 300 ohm twinlead and a 4:1 balun transformer, with coaxial cable of any convenient length being used for the main run to the hamshack—the main advantage being that an antenna tuner isn't required. Bob even obtained acceptable SWRs and operating results on 160 meters as a bonus with this arrangement.

Though WA4PYQ and KJ4RT both reported generally good results with the Modified Windom, readers should be aware of the inherently "unbalanced" nature of the antenna which the balun may not be able to correct. Don't be surprised if you must prune the coax length (keep it short!) to get your solid-state transceiver to properly transfer power to the antenna on one or more bands.

A sad postscript on the Windom: I found in my notes a *QST* obituary on General Windom, W8GZ, for whom the Windom is named. Windy passed away about a year and a half ago. He was the Director of the ARRL's Central Division from 1931 through 1934, and the Windom antenna was but one of his many technical contributions to amateur radio. A highly decorated World War II veteran, he and the late Don Wallace, W6AM, shared the honor of working more DXCC countries on radiotelephone than anyone else—366. He also earned 5BDXCC No. 3.

For more information on the Windom, borrow a copy of our January 1981 column, "The Windom and its Close Cousins." We devoted considerable space to a discussion of the Windom. And that note brings us to . . . .

Obtaining *CQ* Back Issues and Articles. We often receive requests for back issues of *CQ* which contain referenced antennas column articles, as well as copies of individual columns. We normally keep only a couple of personal copies of the magazine for our own files, and thus are unable to furnish whole issues. Often a reader will request copies of an entire series of Antennas column articles. While we can usually help out with a Xeroxed copy of a column here and there, we ask that you first try to obtain the article locally from another amateur, or from a local library—many of the latter receive *CQ*.

Next best is to order the particular issue in which the article is found directly from the *CQ* offices. Back issues are usually available directly from *CQ* for $2.50 each—a good deal. They can be obtained by writing directly to *CQ* at 76 North Broadway, Hicksville, NY 11801, enclosing a check or money order with the request.

If you need a particular antennas column or article and can't obtain it otherwise, I can furnish you with a copy. Figure about $2.00 per article or column, postpaid; several IRCs would be appreciated from overseas readers. When writing, please tell us the exact month in which the column you're inquiring about was published, and include an SASE or IRC for a reply.

Software Snapshot

FIRPLOT. Paul Selwa, NB9K, writes to advise us that he was surprised to not have seen any mention recently of software programs for designing digital filters in *CQ*. Paul proposes to rectify that situation:

"I have developed a program called FIRPLOT, which calculates coefficients for Finite Impulse Response digital filters of up to 128 stages. Program outputs are the numeric coefficients and a printer plot of the filter's frequency response. All data is stored on disk."

"Since I have put so much effort into developing this program and its manual, I can't distribute it as shareware. A sample copy and an instruction file are available through Public Brand Software, P.O. Box 51315, Indianapolis, IN 46251, on disk HR11.0. That version is limited to 10 stage filters. The full version is available from the author for $45.00. Indiana residents add 5% sales tax."

Paul's program is for MS-DOS computers and requires 360K to run. For more information, contact Paul Selwa, NB9K, 61 E. Tilden Dr., Brownsburg, IN 46112.

W2GGE Contest Programs. Back in the March 1986 column we took note of Jack Schultz, W2GGE's contest logging programs for the Apple II family of computers. Jack still has these programs available in separate program versions to handle the Sweepstakes, WPX, 160 Meter, and Field Day contests.

Recently Jack advised us that he was busily converting his Apple programs for IBM format, and already had available separate programs for the *CQ* WWDX and ARRL DX contests. His fast (machine language) and easy-to-use programs are designed for the IBM-PC, XT, AT, and compatible computers. They feature an on-screen log, display of countries and zones worked, all-band scoring, and instant dupe-checking. The programs also feature printout of the log, check list, and QSL labels.

Each contest is priced at $39.95. For more information, contact Jack Schultz, W2GGE, 2 Huxley Drive, Huntington, NY 11743.

IMCT Update. Looks like programs for the IBM-PC are getting the "play" these days! At about the same time that Jack Schultz told me about configuring his logging programs for the IBM-PC, Edward Oros, AC3L, told me that he was converting his International Morse Code Trainer (IMCT) to the PC. You may recall that we described the IMCT for the Commodore 64/128 in the January 1986 column. According to Edward, he made the shift to the IBM-PC because of the memory restrictions of the C-64.

A comprehensive Morse Code trainer, IMCT is menu driven, adjustable from 1 to 20-plus WPM, and guides beginners step-by-step, starting with basic sound recognition and then covering each of the characters. For the advanced student, the package allows letters to be typed and the code heard; handily, the keyboard can be used as a straight key. Computer tests are generated either by the computer or from your own ASCII text files which can be read by IMCT and sent to you as entered or in random order.

There's also a separate "ham radio menu" which allows code testing of often-heard abbreviations and terms, as well as a test to practice call letters. One program option teaches the basics of amateur terminology, explaining those phrases that may confuse the newcomer to Morse Code.

An unusual feature, the one which Edward considers to be the program's best feature, is what he intriguingly calls an "on-screen ham radio," in which actual on-the-air Morse Code transmissions are simulated. This feature allows you to listen to CQs, contest sequences, full QSOs, and even "tuner-uppers" to simulate real-life on-the-air sessions.

IMCT requires DOS 2.1 or greater and 256K or more of memory. It is available on 5¼" or 3½" diskette for $39.95. For further information, contact Edward Oros at AC3L Software, Box 82520, Pittsburgh, PA 15218.

DX Helper. Randy Stegemeyer, W7HR, has come up with a second program offering for the Apple Macintosh user, DX Helper™, which follows hard on the heels of his MacTrak™ satellite tracking program, which we described in last August's column.

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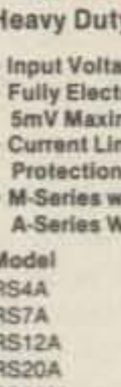

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RS35A	25	35	159
RS35M	25	35	179
RS50A	37	50	229
RS50M	37	50	249

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HF "PERFORMANCE" RIG
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- **Built-in Power Supply and Automatic Antenna Tuner**
- **SSB, CW, FM, AM, RTTY • QSK to 60 wpm**

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- **10 mem. w/scan**
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AL80A	$985.00	ATR15	380.00
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30W in = 170W out
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3-211	220	2-110W	$299.00
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1278 Multi Mode TNC	$219.95
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901/941D Tuners	$59.95/$99.95
949C/989 Tuners	$139.95/$299.95

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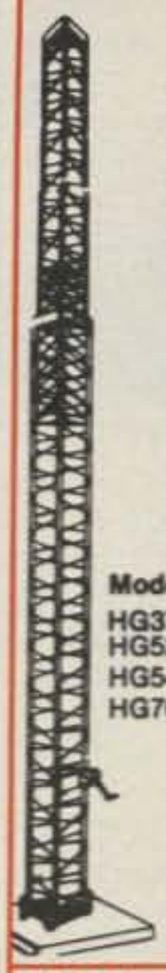

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All Models Shipped Factory Direct—Freight Paid*!

Check these features:
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- Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
HG37SS	37 ft	9 sq ft	$CALL
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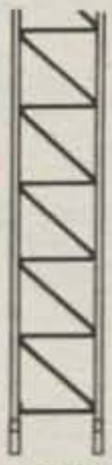

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Packages shown below are rated for wind zone "B" (86 mph wind). Zone "C" (100 mph wind) design prices slightly higher. All tower packages shipped freight collect from our Plano, TX warehouse, in stock for prompt delivery.

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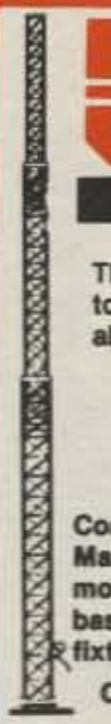
60'	849	1539	1989
70'	1029	1719	2199
80'	1099	2019	2559
90'	1169	2169	2759
100'	1399	2349	2969
110'	1489	2719	3159
120'	1559	2879	3399



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TX472	23'	72'	18 sq ft	2279
HDX555	22'	55'	30 sq ft	2079
HDX572	23'	72'	30 sq ft	3559

Note-US Towers Shipped Freight Collect From Visalia, CA Factory

***Note-towers rated at 50 mph to EIA specifications**

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$.36/ft $349/1000 ft. Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

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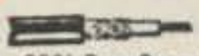

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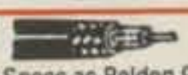

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RG8X	52	.8	1.2	3.5	5.8
9086	50	.4	.64	1.7	3.1
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HELIAX® CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
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All-band Dipole w/ladder line			$29.95
G5RV all band antenna			$49.95

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DX-A 160-80-40 Sloper	$49

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A3 3-el Tribander	$259
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A743 & A744, 30/40 mtr KIT for the A3 & A4	$ 89
R4 20-10 mtr Vertical	$229
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230 WB NEW 30-el 2 mtr Beam	$229
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TH5MK2S Broad Band 5-el Triband Beam	
TH7DXS 7-el Triband Beam	
TH3JRS 3-el Triband Beam	
205BAS 5-el 20-mtr Beam	
155BAS 5-el 15-mtr Beam	
105BAS 5-el 10-mtr Beam	
204BAS 4-el 20-mtr Beam	
64BS 4-el 6-mtr Beam	
12 AVQ 20-10 mtr vertical	
14 AVQ 40-10 mtr vertical	
18 AVT/WB 80-10mtr Vertical	
18HTS 80-10 mtr Hy-Tower Vertical	
23BS 3-el 2 mtr Beam	
25BS 5-el 2 mtr Beam	
28BS 8-el 2 mtr Beam	
214BS 14-el 2-mtr Beam	
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BN86 80-10 mtr KW Balun W/Coax Seal	

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G6-144B 2-mtr Base	$89		

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$16	$17	$19	$22	$26
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TBR160 160m Coil Kit	$55
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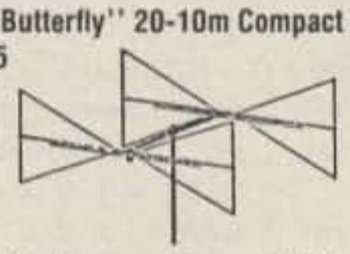
HF6V HF2V

FREE UPS on ACCESSORIES when purchased with antenna

HF5B "Butterfly" 20-10m Compact Beam $229.95



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Alliance U110 (3 sq ft rating)	$49
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Standard 8 cord cables $.22/ft. (vinyl jacket 2-#18 & 6-#22 ga)
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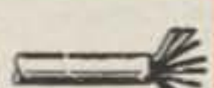

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FK2558	58 ft.	13.3 sq. ft.	1199
FK2568	68 ft.	11.7 sq. ft.	1239
FK4544	44 ft.	34.8 sq. ft.	1489
FK4554	54 ft.	29.1 sq. ft.	1599
FK4564	64 ft.	28.4 sq. ft.	1699
25G Double Guy Kit			$279.
45G Double Guy Kit			$299.

*Above antenna loads for 70 mph winds w/guys at hinge and apex. All foldover towers shipped freight prepaid in 48 states. Prices 10% higher west of Rockies.

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5/16 EHS Guywire (11,200 lb rating)	$.29/ft
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1/4 CCM Cable Clamp (1/4" Cable)	$.55
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3/8EE (3/8" Eye & Eye Turnbuckle)	$6.95
3/8 EJ (3/8" Eye & Jaw Turnbuckle)	$7.95
1/2 × 9EE (1/2" × 9" Eye to Eye Turnbuckle)	$9.95
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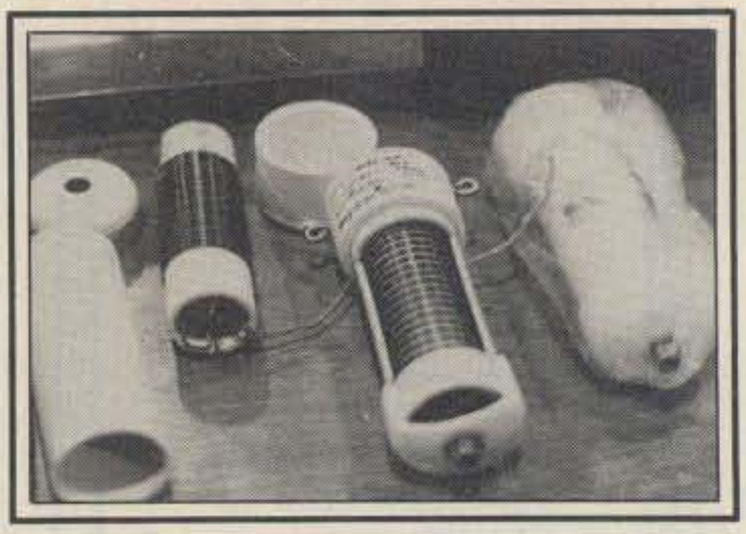
CIRCLE 62 ON READER SERVICE CARD

Most multiband HF antennas are designed to be used with tuned parallel feeders, such as open-wire line, twinlead, or ladderline. All of these generally require an antenna tuner or transmatch for proper power transfer from the transceiver or transmitter. Shown here is one of MFJ's latest entries, the MFJ Differential-T Antenna Tuner. For handling parallel feeder antennas such as the EDZ, G5RV, Windom, centerfed dipoles, and the like, the MFJ unit makes use of a balun transformer rather than an unbalanced T-circuit or inductively coupled circuit to derive a balanced output. (Photo courtesy MFJ Enterprises, Inc.)



The Modified Windom described in this month's column envisions the use of a 4:1 balun transformer at the lower end of the matching section (fig. 2). The balun may be a homebrew device, or a commercial balun kit may be used. (W8FX photo)

Randy's latest entry provides help for the amateur radio DXer while taking advantage of the friendly Mac environment for simplified operation. In addition to "beam heading and distance" data such programs typically supply, there is a world map provided with the current sun location and grayline displayed; the grayline automatically updates every ten minutes.

In addition, other important data is shown, including latitude and longitude, sunrise and sunset times, *CQ* zone, GMT offset time for the selected country, and the current estimated Maximum Usable Frequency (MUF). With a double-click of the mouse, the world map is replaced by an MUF-versus-time 24-hour propagation chart for the selected DXCC country or map location.

Taking advantage of the Mac's excellent graphics capabilities, a great circle (azimuthal-equidistant) map can be displayed instead of the regular rectangular map, one that is customized for your particular QTH. Beam-heading and distance charts can be printed out if desired.

Some other handy features include international callsign prefix and Russian oblast locators, as well as an alarm that you can set to remind you to tune to WWV for solar flux and propagation data. There also is a feature to graphically show just *where* the band is open to, or which areas of the world are likely to be most productive for DX work at the moment. Also tossed in is a code-practice option to help get your code speed up, either for that license upgrade or those nasty CW pileups.

While space doesn't permit us to go into all of the program's options and capabilities, I think we've conveyed the feeling that the DX Helper is a heavy-hitter for the Mac that's priced quite modestly at $24.95 postpaid. A detailed spec sheet is available from Randy Stegemeyer, W7HR, P.O. Box 1590, Port Orchard, WA 98366. (Randy's other software package, the comprehensive satellite tracker MacTrak, is also available directly from him. It's priced at $49.95.)

Aries-1. The first thing in explaining what this hi-tech product is all about is to define the acronym, which translates to **A**mateur **R**adio **I**ntegrated **E**ntry **S**ystem. As indicated by its name, it is a software system that integrates data which is provided by state-of-the-art microprocessor-controlled transceivers and terminal units. The data from these units is simultaneously displayed on the computer screen, and is recorded into a database which becomes an electronic logbook file. In addition, data captured from one device (such as a particular transceiver or terminal unit) may be used by others in the system.

Although the full benefits of this software accrue to those who have a "computer capable rig" or an all-mode terminal unit, Aries-1 is also designed to work effectively as a standalone logging or manual data entry system. The product can be used while operating voice, RTTY, AMTOR, packet, or any other mode.

Some of the program's major features include checking to see if you need a particular prefix while listening to a station calling CQ; searching of a file by various parameters, such as call, prefix, location, date, time, frequency, mode, or QSL information; printing search results to paper or to a logbook file on disk; adding, changing, or deleting items from the log file; a manual "scratch pad" mode; changing terminal unit mode by keystroke command; automatic dupechecking in contest mode; and the ability to run other programs while Aries-1 stays in memory. The program works with a mouse and/or function keys for fast and easy control of terminal units and data entry, and the program automatically inserts into the log the computer date and time as well as the frequency and mode of operation. Handily, it also logs voice contacts, even while simultaneously connected to a packet mailbox and downloading messages into a capture file.

The program supports most of the newer microprocessor-controlled Kenwood and ICOM transceivers, as well as the Kantronics KAM, AEA PK-232, and Heath HK-232 terminal units. An IBM-PC with DOS 2.1 or greater and at least 256K memory is required (640K is recommended), as is either a Hercules, CGA, EGA, or VGA display. RS-232 ports, two disk drives, and a Microsoft Mouse are optional.

Ashton ITC, Aries-1's manufacturer, offers a small brochure explaining the product which includes a nifty RTTY QSO scenario as an example showing how the program's "data integration features" can productively be used in the hamshack. The brochure is available from Ashton ITC, P.O. Box 1067, Vestal, NY 13851-1067. The Aries-1 program is priced at $89.95.

DATACOM Programs. Another "hi-tech" hamshack software package for microprocessor-controlled transceivers and receivers is offered by Data Communications International, Inc. The DATACOM programs are billed as providing a "complete program environment," one that is menu-driven and can add a frequency scanning function to radios that do not normally support scanning. Most Kenwood, Yaesu, and ICOM units are supported.

The program's background is an interesting one. According to the firm's president, William D. Roig, the program was originally written to get around a limitation in the Yaesu 757GX transceiver, in which changing frequencies in the general-coverage mode became cumbersome. According to Bill, this operation required the band-change button to be pushed 38 times to go from 1 MHz to 14 MHz.

Too, Bill also was interested in listening to radio services in addition to amateur radio, such as aviation weather (HF and VHF), shortwave broadcast, marine, AM-FM-TV broadcast, land mobile, and others. When looking for all these frequencies, it was difficult to remember them, and rather than having to look them up in a book or log, he believed that these services' frequencies could be incorporated in a single program to manage the radio. Thus, the program's concept was born.

Support of the Yaesu 9600 monitor receiver was included next, so that one would only have to type in a frequency or select it from a menu and, depending on the frequency, the commands would be sent to the radio. In addition to the basic functions supported by the radio's command set, Bill also determined that he would like to include a function to sweep a band of frequencies and to scan predetermined channels.

After the initial work with the Yaesu radios, the program was expanded to work with the ICOM R-7000 and R-71A receivers, especially since both of these sets—in addition to ac-

Say You Saw It In CQ

cepting commands as did the Yaesu radios—also were capable of transmitting data (such as frequency, mode, band limits, and other parameters) back to the computer. At this point, Electronic Equipment Bank (EEB) and Gilfer Shortwave requested that he write a version for the Japan Radio Company NRD 525 receiver. The JRC set was particularly interesting as the radio could also set parameters such as Automatic Gain Control (AGC) level, attenuator setting, and other functions. Next came the ICOM 751A and 735 transceivers and most of the Kenwood equipment family.

The basic requirements for the DATACOM programs include an IBM-PC or compatible with one floppy disk drive, a serial port, and 256K RAM (hard disk preferred); an interface between the PC and the radio; and a radio or radios that allow computer control. The DATACOM programs range in price from $99.95 to $229.95, depending on the number of radios to be controlled and whether or not an optional spectrum analyzer feature is desired. An interface between the PC and the radio is generally required; two versions are available from the firm.

For a detailed spec sheet on the DATACOM programs and information on configurations to support your computer and transceiver or receiver, contact William D. Roig, President, Data Communications International, Inc., 8081 W. 21st Lane, Hialeah, FL 33016.

As this column went to press, the firm announced an upgraded and enhanced DATACOM III Version 6.0, along with a new price list for the software and hardware. A new brochure describing V. 6.0 is available from the company.

Computer Survey. Stan Horzepa, WA1LOU, who chairs the *QST* "On Line" column, ran a survey last year to, among other things, get a handle on what were currently the most popular computers for hamshack applications.

The results of Stan's survey aren't terribly surprising: the Commodore 64/128 and the IBM-PC were together favored by nearly 75% of the 164 respondents as the computers they used most often for amateur radio applications.

Getting a little more specific, the C-64/128 was named by 43.6% of the 164 respondents. Close behind was the IBM-PC family and clones, at 30.7%. Not far behind were the Apple II family and clones (7.8%), the Tandy Radio Shack Color Computer (5.6%), and the Radio Shack Model 100 (2.2%). Garnering less than a 2% response were the Apple Macintosh, Kaypro family, Texas Instruments TI-99/4A, and Radio Shack TRS-80 Model III.

Interestingly, in reporting the survey results in last October's "On Line" column, Stan notes that when the last survey was conducted in early 1986, the C-64 was then the most popular computer (but used by only 20.1% of the respondents), while the IBM-PC was tied in fourth place with a 5.2% response. Notably, the Tandy/Radio Shack Color Computer and the Apple II families have held their ground between the first and second surveys.

Short Bursts

Back Issues. We've already mentioned how you can easily obtain back issues of *CQ* directly from the magazine, at 76 N. Broadway, Hicksville, NY 11801, for $2.50 a copy. But what if the issue is sold out, or if you want a copy of *another* amateur magazine?

A good source, though a chancy and casual one, is the next amateur fleamarket in your area. Back issues of the "big four" amateur magazines (*CQ, QST, Ham Radio*, and *73*), as well as the excellent but now-defunct beginner-oriented magazine *Ham Radio Horizons*, can generally be picked up at from anywhere from 10 cents to 75 cents apiece, depending on condition and age, at most swap meets.

For a little more you can get back issues of the "big four" magazines on a more regular and dependable basis from W6LS, the Lockheed ERC Amateur Radio Club. Their back-issue magazines are priced at 75 cents apiece through 1975 and $1.00 apiece for 1976 to the present. These prices include shipping, and there is a $3.00 minimum order. The magazines are available from W6LS, 2814 Empire, Burbank, CA 91504-3297.

Another source of "big four" back issues is Mission Consulting, Inc., 11903 Alief-Clodine, Suite 500, Houston, TX 77082. They have an extensive collection dating from the 1920s to the present and especially focus on helping collectors fill missing "odd issues" for their collections. Write to them for prices on specific issues.

Where Oh Where Can I Find It? Many letters we receive ask if we know of a source of a particular type of hamshack software program for a particular computer, such as a logger for a TI, or a keyboard Morse terminal for an Apple, to use but two examples.

Sometimes we can help, and sometimes we can't. We do keep a computer-based database that lists the names all of the programs previously mentioned in the column, so often we can "dig up" the answer to a request that way. Other times we can refer one to a more specialized resource for a particular computer.

Often, though, in the fast-changing world of hamshack software, my information becomes outdated. New programs are issued, old ones dropped, and some firms simply disappear after a year or two at the difficult and fickle business of marketing amateur radio software. At one time I even kept a database of "amateur radio software sources," but ultimately I had to drop it because it became impossible to keep the database up to date.

However, many readers overlook a resource that's immediately available to them, one they can check themselves. That's the classified ad section of the major amateur radio magazines, such as *CQ*'s own Ham Shop, which always appears near the tail end of the magazine.

Most of the classified ad sections contain ads for new software programs for a variety of computers, not just the C-64/128 and IBM-PC, which are currently in hamshack vogue. While no one can guarantee good results from programs so discovered, sending away for literature and spec sheets on these programs can often result in "just the ticket" for your needs.

Don't overlook the small display ads typically run by small software entrepreneurs, also usually appearing near the tail end of the magazine or sandwiched between the larger ads from major advertisers. Most hamshack software companies are small firms who advertise modestly—though a modest advertising budget doesn't necessarily mean that their wares are second-rate. Check them out.

Wrapping It Up

That's all for this time, gang. Next month more Antennas & Accessories topics of current interest. See you then.

73, Karl, W8FX

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CIRCLE 117 ON READER SERVICE CARD

World of Ideas

a monthly feature by
DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

Classic Rigs For Your Classic Keys

As promised in our February "World of Ideas" column, this month's feature is more "bring 'em back to life" details on classic rigs of yesteryear. We have some neat little hummers that are right out of the early 1930s. They are easy to assemble, and they produce an impressive low-power signal on today's HF bands. Do they work DX? Can Hank Aaron hit a baseball? Less than two weeks ago I contacted Australia and England while using one of these gems. The little critter perked so good, in fact, that it continued calling DX stations after I switched off its juice! I had to pull its tube and hide my old bug to stop it from working. Yes indeed!

The only entanglement you may experience in home construction of these units is locating authentic old-time parts. Good starting points are the ad pages of *CQ*, hamfest fleamarkets, attics, garages, and storerooms of closed but not destroyed radio repair shops. The goodies are still out there and waiting to be discovered, but they are getting rather scarce. You may need to buy a complete radio to secure its tuning condenser and tube sockets or search a couple of weeks to find a body-end-dot resistor, but such is the cost of true nostalgia. Remember, we are talking about proud classics here, not simply old junk. There is a significant difference!

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While modern transceivers with their numerous bells and whistles are undeniably superior in performance, the thrill and excitement of using old-time gear is truly in a class of its own. As I have said before, the operator rather than the rig makes the difference! There are several points to consider, however, before actually placing 1930-style gear on the air in 1989. Key clicks, chirp, drift, and harmonics must be held to a minimum, and self-excited transmitters should be continuously monitored to assure in-band operation. My simple answer to those requirements is using only 4 or 5 watts of RF for minimizing QRM to the natives, employing battery power for a beautiful DC note, and placing the key on a separate desk to avoid frequency warbling vibration.

Since I personally use the rigs on our low-power-favoring band of 30 meters, they "get out" in high style. If you question that statement, simply reduce your modern transceiver's output to a few watts and use it on 30 meters yourself. The results are usually great. This band is a QRP haven.

If you are not familiar with assembly and operation of vintage gear, seek the advice and guidance of a local-area old timer before proceeding. Ready for the challenge? Clean a spot on the workbench, unwrap your favorite old bug, and let's roll with some genuine old-time radio fun. The thrill of yesteryear returns!

The Double M Special

This master of the airwaves was featured in *The Transmitter* magazine and passed along to me by Dick, W6BIB. He purchased my book *Golden Classics of Yesteryear* and has been overcome with nostalgia ever since. (Dick should have been here when we were putting the book together. The funny-farm's rescue squad threatened, but I escaped . . . wagging my rigs behind me!)

The Double M is a cross between the famous Hartley and TNT transmitters that graced many attic and garage setups during the golden 30s. Its unusual technique of mounting the grid coil inside

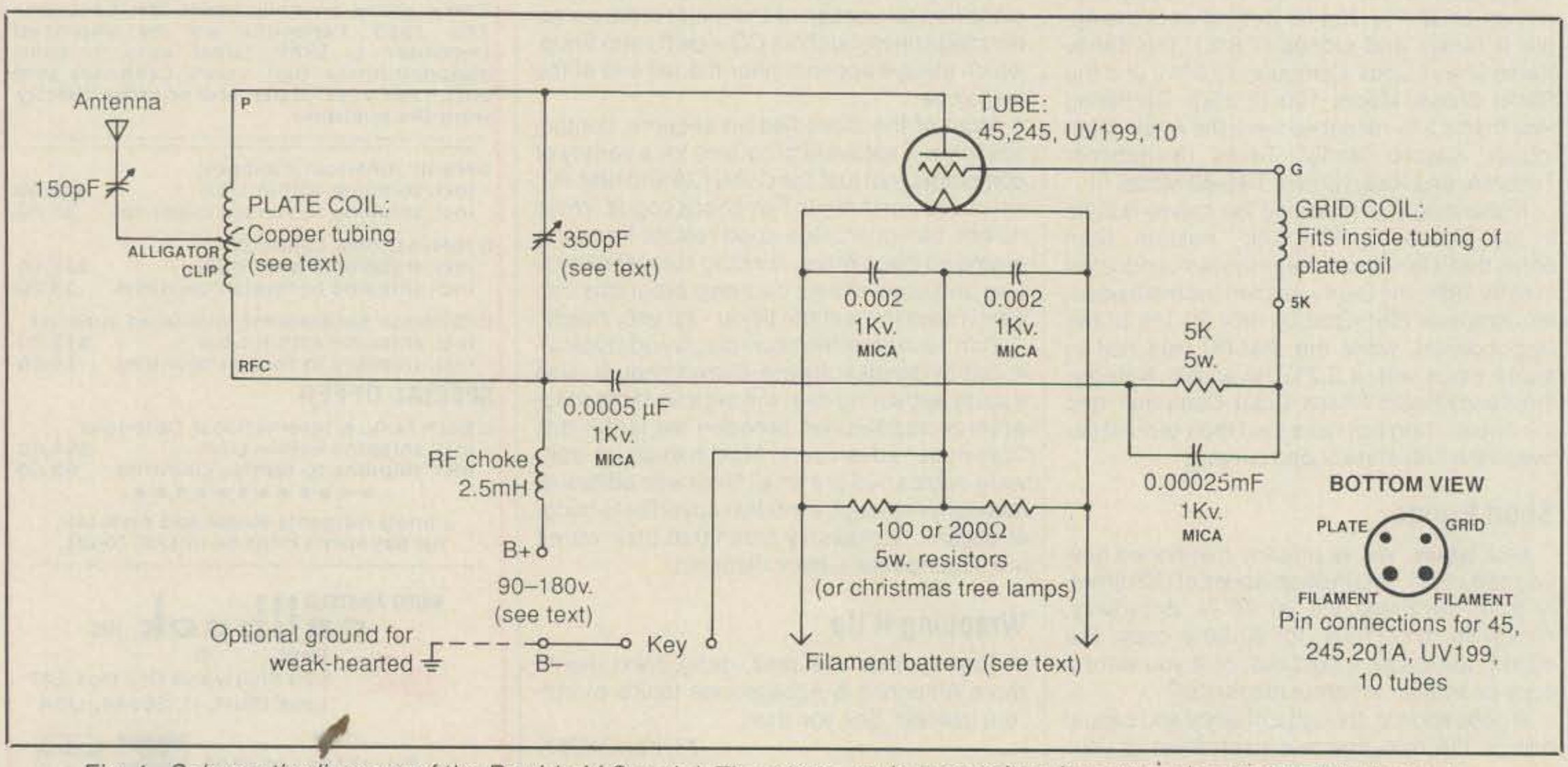

Fig. 1–Schematic diagram of the Double M Special. The 1930s-style transmitter is powered completely by batteries.

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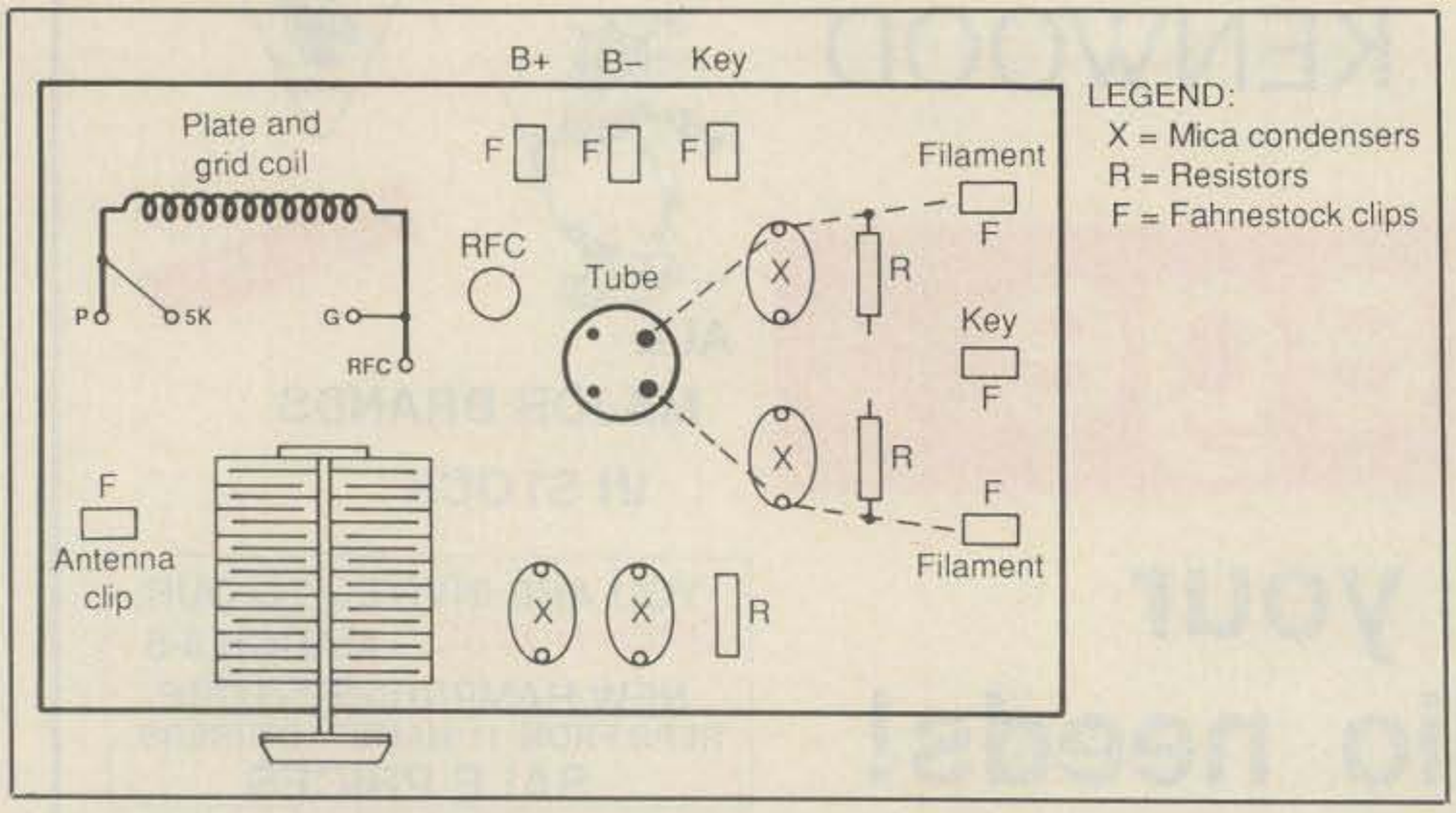


Fig. 2– General parts layout for the Double M Special. This is not a full wiring guide, but rather an illustration for positioning major components. (Note: X = mica condensers, r = resistors, and F = Fahnestock clips.)

the plate coil (literally) did not acquire mass popularity, but it was a sure-fire design for first-time success.

The transmitter's schematic diagram is shown in fig. 1, and its relatively noncritical parts layout is included in fig. 2. I added a couple of minor modern-day changes for proper operation. First, a coupling condenser was placed in series with the antenna lead. (The original schematic placed full high-voltage right on the antenna! That should keep the riff-raff on their toes.) Second, keying was moved to the negative line rather than breaking the high voltage (that would definitely keep the operator on his toes!). Finally, I switched to a transmitting tube rather than *The Transmitter's* suggested receiver/detector-type 227. (Can you believe they would consider such evil use of such a tender gem? Evidently, anything that had four pins and would fit the socket was considered fair game.)

Although the original Double M was assembled on an 8″ × 10″ pine board, I opted for a slightly smaller size decoupage plaque obtained from a local craft store. After applying three coats of varnish, it looked like a trophy. Likewise, my completed transmitter is a real showpiece. All components were cleaned to like-new condition and mounted on the board using authentic-era brass screws. Then number 14 solid wire was used to complete the assembly. Using heavy wire, incidentally, serves the important purpose of assuring good frequency stability. Everything must be rigid and secure.

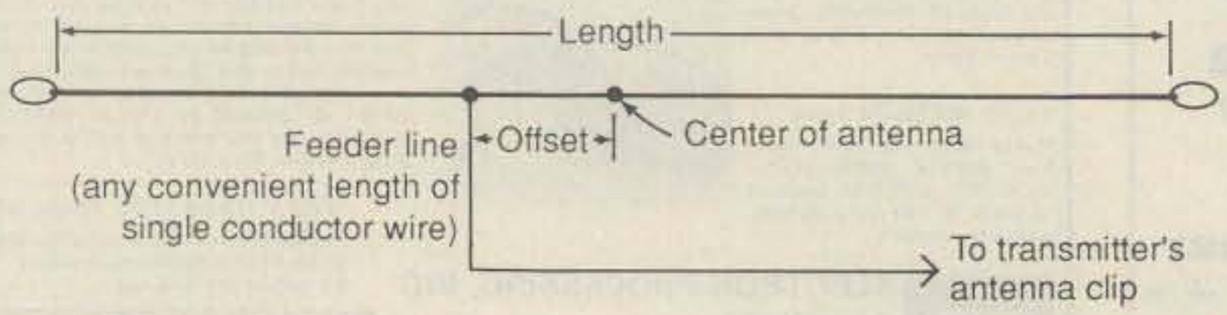
In all honesty, I built this transmitter twice. My first board was unevenly varnished and the tuning condenser, tank coil, and tube were lined up "one behind the other" like the original Double M. The tube's glamor was restricted, so I moved the tuning condenser and coil to the board's left side. Both versions worked fine, thus confirming their uncritical parts layout. If you connect all wires correctly, this little gem will transmit on the first try!

The combination plate and grid coil consists of ⅛ or ¼ inch copper tubing wound with an inside diameter of 2⅞ or 3 inches and stretched to an approximate length of 4½ inches. Wind 10 turns for 80 meters, 5 or 6 turns for 40 meters, and 4 turns for 30 meters. In straight tubing lengths that equates to a 100 inch piece for 80, 62 inches for 40, and 43 inches for 30 (and allows a couple of extra inches on each end for mounting). The previous dimensions also assume a 500 pFd tuning condenser is used for 80 and 40, and a 350 pFd variable is used for 30 meters. There will be variations and overlap of coverage, however, so "tweaking" coil turns spacing and "tinkering" with condenser plates will be necessary (more details on that later).

Insert the grid coil's wire through the copper tubing before winding. That wire's size is not critical. Just be sure it is well insulated, is not cut or nicked while "threading," and fits snugly inside the copper tubing. Squirt some WD-40 or household cooking spray into the tubing and along the wire for easy insertion. *Also note the coils' polarities.* The copper coil's left side connects to the tube's plate; the (internal) grid coil's left wire connects to the 5K ohm resistor and 250 pFd condenser. The copper coil's right side goes to the RF choke, and the internal coil's left wire routes to the tube's grid. Flatten and drill the copper tubing's ends (watch the grid wires!), and then secure it to the board with brass screws.

If desired, the RF choke can be homebrewed by winding roughly 100 turns of number 26 to 30 cotton-covered wire on a 1 inch dowel. Thumtacks at each end make good terminal posts. Alternately, any 1.0 to 2.5 μH choke is fine. If you really want to go 1930s-style, the 100 ohm filament resistors can be replaced with a pair of Christmas-tree lights (the first jeweled pilot lamp, by golly!). Genuine Fahnestock clips are preferred for external connections, but you can substitute hardware-store-type screws with decorative thumbnuts. Some of the new styles look like genuine oldies.

A high C-to-L ratio is desirable in the tank circuit, but it makes frequency tuning difficult (my first Double M whisked from 10 to 12.5 MHz in one dial rotation!). I added "electrical vernier action" by using a transmitting-grade 50 pFd variable condenser and parallel wiring a 300 pFd "block-type" fixed condenser to its rear frame. I then spread the copper coil's turns until it "hit" 30 meters. The rig now covers 10.1 to 10.7 MHz. A plate could be pulled from the variable "dentist style" (wiggle three times and yank!), but more fixed capacity would be required (are you getting alignment ideas?). Remember to tinker and perfect frequency coverage before connecting an antenna. Staying within an amateur band is your responsibility!



BAND (METERS)	LENGTH (FT)	OFFSET (FT)
80	133	18.4
40	66½	9.2
30	43	6.4

Fig. 3– Details of the classic Windom antenna. This skywire is a perfect mate for the Double M Special transmitter.

Say You Saw It In CQ

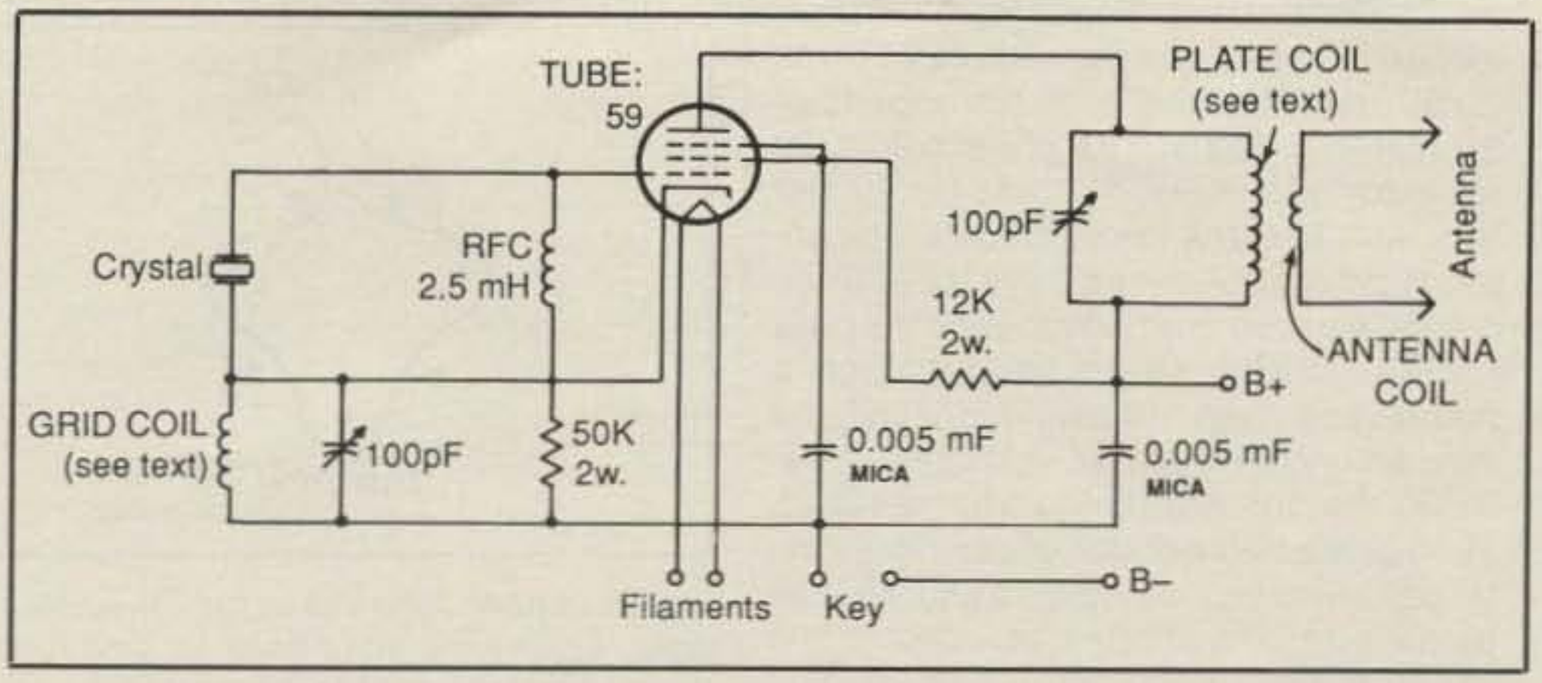


Fig. 4– The classic Tri-Tetter transmitter. This crystal-controlled unit produces a stable signal, and full battery power assures a clean note.

Although numerous types of 4-pin tubes can be used successfully in the Double M, I suggest a number 45 or 10. Other good choices are the 201A (almost sacreligious at $20 apiece) and the UV199 (a true collector's item). The 45 has a 2.5 volt filament, so use a .5 ohm 5 watt "sand resistor" in series with its 3 volt dry-cell battery. The other tubes require a 6 volt battery for the filaments (a .5 ohm resistor in series there extends tube life). Using pure DX on the filaments and plates, incidentally, assures a clean CW note (and sidesteps building an AC supply).

Please take my advice and use batteries for both filament and plate supplies. The plate battery is assembled by series "clicking together" a double-handful of popular 9 volt batteries. Ten of them will give you about 5 watts input, while 20 of them will put you in the 10 watt class.

After you are sure the Double M's signal is clean and operating within an amateur band, you are ready to connect an antenna and put it on the air. You are ready to connect an antenna and put it on the air. You will, naturally, want to go authentic 1930s, so details of an off-center-fed Windom are included in fig. 3. Experimentally clip the antenna-coupling condenser's lead to the copper coil near its "plate" end (make sure the key is open at that time!), and then shift its position one turn at a time until maximum output is indicated on a field-strength meter. Adjust the coupling condenser until output drops slightly, and you are ready for big-time action (the reduced output assures light loading—a necessity for stable operation when your antenna swings in a breeze). As a finishing touch to this beautiful setup, I suggest adding a small NE2 neon lamp to each end of the antenna. You can then look out your window at night and watch your Morse headed for distant lands. No ground, you say? One was not included in the Double M's original schematic (adds an operator challenge!), but I suggest connecting the rig's B – terminal to a good ground. Good luck, and good DXing!

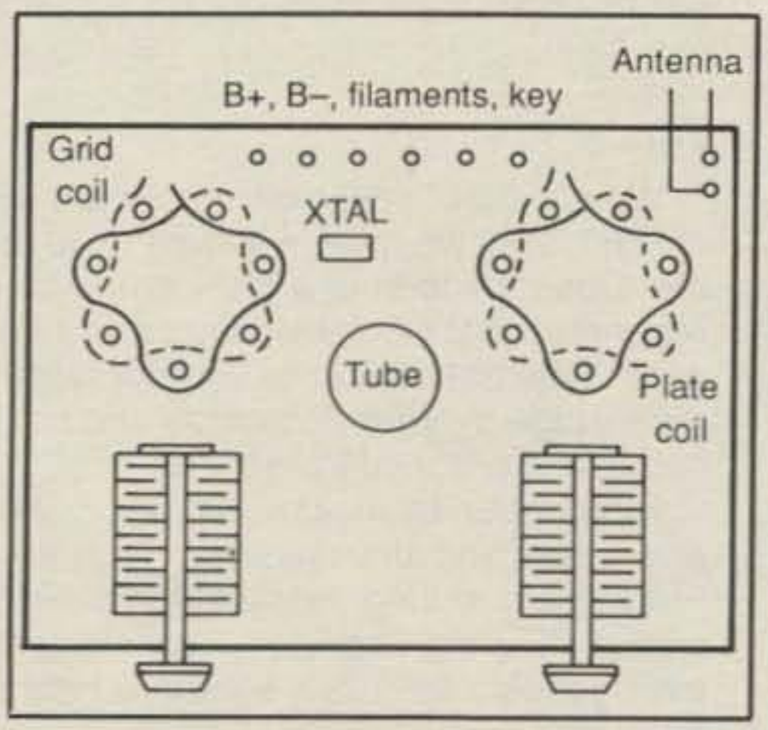


Fig. 5– Suggested layout of main components for the classic Tri-Tetter transmitter. The unit can be assembled on a pine board or cardboard cigar box, as desired.

The Classic Tri-Tetter

If you are unfamiliar with alignment and operation of self-excited transmitters like the Double M and are leery about out-of-band operation, our crystal-controlled unit shown in fig. 4 is the ideal answer. This little gem introduced the classic Tri-TeT oscillator to radio amateurs during the 1930s, and it features two-band operation with one crystal. A "rock" on 3.520 kHz, for example, can be used on both 80 and 40 meters by simply changing coils. The main attractions of this little gem, however, are its low cost of assembly and use of an almost forgotten number 59 tube. Build one. You will love it!

The Tri-Tretter's schematic diagram and layout of main components, both of which were passed along to me by now-deceased K4HAR, are shown in figs. 4 and 5. The original unit was built on a John Ruskin cigar box obtained free for the asking from a local soda fountain and drug store, but an 8" × 10" pine board will be a better modern substitution.

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The circuit is laid out with the grid condenser and coil on the left, tube in the middle, and plate circuit on the right. Fahnestock clips or screws with thumbnuts can be used for external connections. The coils and all wiring use hardware-store-obtained doorbell wire; one two-bit roll built a full transmitter! Looking at that old-time cotton-covered solid wire, it is number 14 or 16 (not critical, but the wire should be stiff enough to hold its shape after bending or rolling in a coil). The fixed condensers are big micas (no wimpy discs here!). The resistors are 2 watt "oldies" (body color is first number, end is second, and center dot is multiplier of color code). Crystals for this rig can be obtained from JAN crystals at P.O. Box 06017, Ft. Myers, FL 33906-6017. If you are in a hurry, they offer two-day service by calling 1-800-237-3063. Order a crystal today, gather parts and build the Tri-Tetter tomorrow, and you can be on the air 1930s-style this weekend.

The bellwire-wound grid and plate coils are self-supporting with a diameter of 1¾ inches. The grid coil consists of 20 turns for 80 meter crystals or 10 turns for 40 or 30 meter crystals. The plate coil is 30 turns for 80 meters, 15 turns for 40 meters, and 10 turns for 30 meters. The antenna pickup coil uses 6 turns for all three bands. A convenient way to wind the coils involves driving seven nails through a board, and then "basket weaving" the wire around the nails as illustrated in fig. 6. Tie the coil with string after winding. Then glue small wooden dowels in a similar pattern to your pine board and use it as a coil form. The antenna coil should slip above the plate coil; vary their spacing (by sliding the coil on the dowels) until maximum RF output is indicated on your wattmeter or field-strength meter.

This little gem is also battery powered for simplicity and signal purity. As previously suggested, use a .5 ohm 2 watt resistor in series with a 3 volt dry cell for the 59's 2.5 volt filament. Plate voltage can be 90 or 180 volts. If desired, you can eliminate the 12K ohm screen grid resistor and connect that wire directly to a "tap" in the plate batteries. Approximately 72 volts is fine for a 90 volt plate supply, and 135 volts is fine for a 180 volt supply.

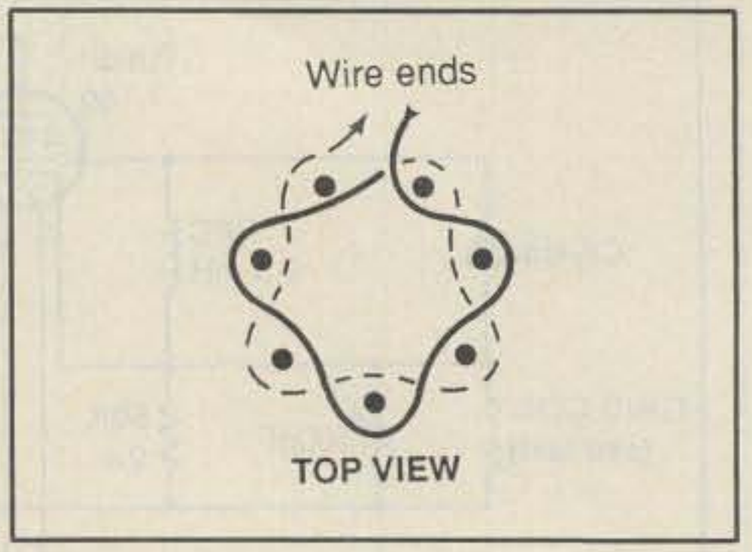

Fig. 6– Outline for winding the Tri-Tetter's coils. Follow the solid lines for one turn, the dotted lines for the next turn, etc. Secure the coils with string before removing from their nail form (see text).

Initial tune-up is a snap. Place a number 47 pilot lamp across the antenna coil's connections, tune your receiver to the crystal's frequency, and key the transmitter. Adjust the grid condenser until the rig oscillates, and then quickly tune the plate condenser for maximum pilot-lamp brightness. Move the antenna coil up and down to peak that brightness, and then retune the plate condenser for maximum output. Finally, retune the grid condenser for smooth, chirpless operation.

Ready for action? Connect your dipole antenna to the pickup coil and retune the plate condenser for maximum output. This "deep south special" may not be fancy and sophisticated, but it works great. I have worked several countries with mine, and you will probably do even better. Good luck, and remember to "tune around" after calling CQ on 30 meters. Several nostalgia buffs are running crystal rigs and "barnyard wide" receivers, but you can't spot us if you are only listening in a 500 Hz "window." Remember the classic tradition of "tuning for a call"!

Finale

We are out of space before we are out of rigs! Shall we have a sequel? You tell me. Does the idea of a mating one-tube regenerative DX receiver and a miniature acorn tube transmitter catch your fancy? I will judge by your postcards and comments and proceed from there.

Remember to include an SASE with any letters and allow plenty of time for a reply. I am writing yet another book(!), plus putting together some special first-ever goodies for 1989, so spare time is fairly rare.

Until we meet at a hamfest forum, on 30 some evening, or on 20 SSB some Sunday afternoon . . . .

73, Dave, K4TWJ

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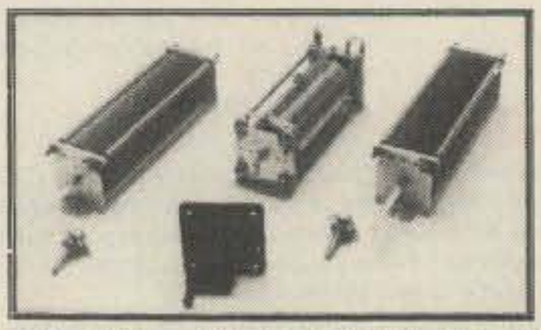

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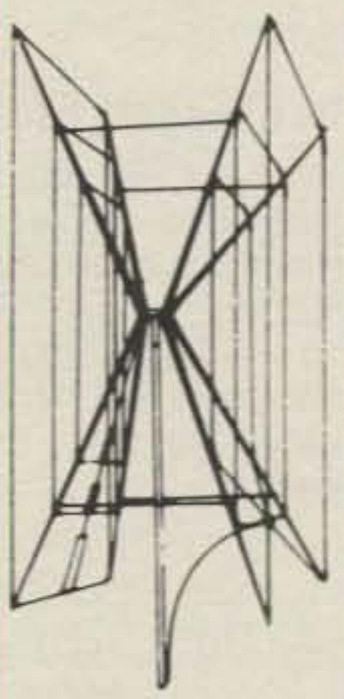

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Washington Readout

a monthly feature by
FREDERICK O. MAIA, W5YI

REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

Modernizing Amateur Radio—How Do You Feel About It?

We have been commenting over the past couple of months about the present status of amateur radio in the United States and asking if it is time for a change in our entry-level requirements. We mentioned that although technology, interests, and amateur operations have changed drastically, the manner in which we determine who shall gain access to the amateur bands has not. This month we are asking that you participate in a novel, unprecedented *CQ* survey! We want to know how you feel about updating the amateur radio entry-level requirements.

Entry into the Amateur Radio Service is still based on demonstrated manual Morse code proficiency even though its commercial usefulness has given way to far superior, automatically-routed, self-correcting digital communications. No one doubts that the direction of amateur operations is toward the newer emissions and modes. Computer-to-computer communications using radio-wave and satellite freeways is mushrooming! Manual Morse code is declining. Like it or not, those are the facts. Such a statement will elicit emotional denials, but the skeptics can tune between 160 meters and 450 MHz while tabulating the number of phone and CW QSOs. Above 30 MHz you will be hard pressed to find a CW conversation.

As a CW operator (and I'm a member of the Society of Wireless Pioneers, an organization of *ex-professional* Morse operators) I get a little nostalgic when I realize that an important part of wireless history is withering. But it is a certainty. Technology, like life, is constantly changing, and usually for the better.

The Changing Face of Amateur Radio

Being a marketing professional, I recently conducted a little market research of my own on radio-hobby interest. I have great faith in our free-enterprise system and the reality that product distributors must have what the public craves—or believe they want. Business simply must cater to society or face extinction. Competition being what it is, over the long haul the marketplace always makes an accurate statement about current and future trends. Read that sentence again and you have passed Marketing 101. The trick is learning how to "read" the marketplace.

The "market" in this case is amateur radio operators. The informal research that I conducted was in six areas: amateur radio advertising, hamfests and fleamarkets, written articles appearing in amateur radio publications, amateur products in ham outlets, electronic product catalogs, and amateur radio modes/emissions as a factor of operator age. The survey is one you can easily do yourself!

I reviewed issues of five different amateur radio publications *(QST, CQ, 73 Magazine, Ham Radio,* and *World Radio)* over an extended period of many years. Like most amateurs I keep magazines for later reference—something, by the way, that never seems to occur. I not only looked at the ads, but the magazine article topics as well. The index of advertisers and subjects from 10 or 20 years ago certainly bears little resemblance to that of today.

For one thing, several—if not most—of the larger equipment companies of 20 years ago are no longer advertising in amateur magazines today at all! Many seem to be out of business. Gone are the advertisements of Hammarlund, Hallicrafters, World Radio Laboratories, National, E.F. Johnson, Clegg, Gonset, Collins, Wilson, Harvey-Wells, Midland, Atlas, Genave, Signal One, Swan, Drake . . . And the ads for "components"—transformers, tubes, relays, meters, and such—have just about disappeared. Many firms, seeking a wider market, have downplayed or eliminated amateur radio gear in recognition that consumer inclinations exist elsewhere.

Construction articles seem to have given way to more operating topics. There are increased VHF and higher frequency articles. Analog has given way to digital, sideband to satellite, American-made to offshore imports, the neighborhood amateur radio store to mail order, tubes to microprocessors . . . Look for yourself!

It used to be that most amateur gear offered at hamfests and fleamarkets was low-band DX-oriented. Today the equipment seems to be taking on a silicon and space look! The amateur's traditional building blocks have changed. Resistors, tubes, and capacitors at the fleamarkets are now computer chips, software, and satellite dishes. Code keys (now almost impossible to find at any amateur radio function) and microphones have been replaced with computer keyboards and floppy disks.

There seem to be more smaller VHF and higher band antennas being promoted. DX signals are increasingly electronically relayed from space. Dits and dahs are being displaced by ones and zeros in the amateur marketplace. Amateurs now accomplish electronically what they did manually just a few short years ago. Digital automation has now just about consumed amateur radio. Are the shortwaves becoming obsolete? Are they being replaced by microwaves? It doesn't seem all that many years ago when they were the unexplored future of amateur radio. Yesterday's "experimental" *world above 50 MHz* is now an everyday communications vehicle for virtually any range. You no longer wait for propagation, you make your own!

Amateur Radio, An Old Man's Pursuit

The bottom line is that our overall amateur licensing requirements bear little relationship to the interest and intended operation of those who might enter and contribute to the radio hobby! We are faced with a stagnating Amateur Radio Service. Our numbers are not growing significantly and haven't since the seventies when the CB boom stimulated the communications appetites of thousands. Because of the long-term licenses, there could actually be a decline in the number of amateurs without our knowing it. When amateurs become Silent Keys, their names and calls are not removed from the FCC computer. This will not occur until the license of the deceased is not renewed in the 1990s!

Amateur radio should be encouraging our nation's youngsters to pursue a technicial, engineering, or scientific career. Our youth are indeed interested in high technology, but the code precludes their participation in amateur radio, the nation's foremost electronic hobby. We can talk all we want to about how easy it is to learn the code, but newcomers simply

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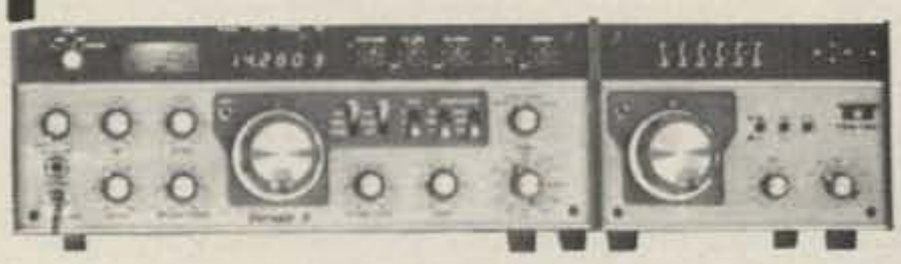

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don't care about it and aren't doing it. They are using computers over the phone lines and chatting on bulletin boards. Most would make excellent amateur radio candidates.

The Boy Scout radio merit badge has not been available for nearly four years. Although the American Radio Relay League has been working with the Boy Scouts to revive the radio merit badge, it is still not available as of this writing. I recently chatted about amateur radio with a high-ranking official at the Boy Scouts of America International Headquarters here in the Dallas area. T. J. Van Houten is in charge of the BSA merit badge program. He said youngsters no longer have any interest in flag waving (semaphore) and Morse code. BSA is updating their merit badges to conform with today's interests and technology. The book-binding merit badge has now given way to graphic arts. Van Houten told us that today's kids want information on robotics and computers. BSA now has (or is working on) these new high-tech merit badges! The Boy Scout signalling and radio merit badges are being de-emphasized or phased out!

I explained to Van Houten that amateur radio encompasses all types of current electronic information exchange including computers, but he did not seem convinced. His view was that Morse code is a relic from the communications past and kids are turned off by it. We can hardly expect newcomers to share our feelings of Morse nostalgia and tradition.

Need for Amateur Radio Expansion

While written amateur radio operator license examination elements are periodically updated, the Morse code requirement hasn't changed in decades. Most amateur Morse operation is by older, long-licensed amateurs. The generation gap seems to exist in amateur radio just as it does in most other areas. The average amateur radio operator age is now 50, and with younger blood not entering amateur radio growth has stagnated.

Our amateur spectrum is extremely valuable! The advantage of the higher frequencies is as apparent to the commercial user as it is to the ham operator. VHF and up frequency signals used to be considered useless for long-distance communication since they were not refracted back to earth. They simply penetrated the ionosphere and were lost. Satellites now capture these signals and return them to earth, making VHF/UHF/microwave spectrum worth more than ever.

Since the Amateur Radio Service has more spectrum per licensed user than any other service, it is little wonder that commercial interests and government regulators consider amateur spectrum underused. We have already lost 2 MHz of 220 MHz spectrum, and you can be certain it won't end there.

Why then does the FCC require amateur radio entrants to learn the code? Actually, the government has tried several times to reduce or eliminate the Morse restriction on certain bands, but the American Radio Relay League has always opposed any effort to relax the code requirement. The ARRL takes this position because they believe that viewpoint represents the consensus of its 150,000 members. However, for decades the ARRL has been telling these members that Morse code testing was essential to all phases of amateur radio operation. It certainly appears the members believed what they were told. There also seems to be some validity in the statement that many amateurs do not want Amateur Radio Service growth since it brings possible interference to their operations and congestion. The League actually does not represent amateur radio. They represent the opinions of its membership, and there is a difference!

Amateur Radio Restructuring

At the urging of its two amateur radio organizations, early in 1988 Canada committed itself to restructure its Amateur Radio Service to include entry at the VHF level without Morse code knowledge. On September 8th R. W. Jones, Director General of Canada's Regulatory Branch, made it very clear in a letter to Canadian Radio Relay League President Thomas B. J. Atkins, VE3CDM, that a new "modular" approach to amateur radio had been approved and the only point left open to public discussion was the implementation plan, including the examination content. A draft of their RIC-24 (Regulatory Information Circular) covering the amateur radio operator examinations was later prepared.

While not in place, there remains no doubt whatsoever that Canada is going ahead and changing their existing three "certificate" classes to a "modular" licensing setup. The Amateur, Advanced, and Digital Certificates will soon become Certificates "A," "B," "C," and "D." "A" allows access to all amateur spectrum (all modes/emissions) above 30 MHz when a written examination is passed covering regulations, procedures, and basic theory. There is no telegraphy requirement for their entry level, which conveys excellent privileges!

Certificate "B" allows all amateur bands below 4 MHz and requires 5 WPM telegraphy proficiency. Passing 12 WPM (Certificate "C") authorizes all amateur bands below 30 MHz. Certificates "A," "B," and "C" permit 250 watts from commercially available transmitters. Certificate "D" requires advanced theory in exchange for the right of a Canadian amateur to build his own transmitter and radiate 1,000 watts. Implementation is expected during late summer/early fall 1989.

Canadian Proposal For The U.S.?

That really caught my attention, since Jones's letter to the CRRL came right on the heels of the August 4th FCC reallocation of 2 MHz of the 220-225 MHz amateur band to commercial interests. Because of no-growth we lost 220–222 MHz, and we could lose more domestically. Your friendly brown UPS truck will soon be coordinating package delivery in the 220 MHz amateur band! While the ARRL has given the impression that these reallocated frequencies have not been lost, the chance of retaining this spectrum is just about non-existent.

Frequencies are by far our most valuable resource. Without them we have nothing! All of the amateur bands at 220 MHz and higher are shared with other services and can legally be reallocated by the FCC. How much government support for amateur radio do you think we will get when it is perceived or documented as a stagnant or shrinking underutilized "old man's" service? Think about it!

It is obvious that amateur radio needs to be revitalized, particularly among our youth and computer fanciers. It appeared to me that Canada had the answer to our problems in the United States. I contacted Ray Kowalski, the FCC official who previously governed the Amateur Radio Service. Ray now works for a private Washington, DC communications law firm. I asked Ray what it would take to restructure our Amateur Service based on the Canadian model—that is, an entry level without a telegraphy requirement.

Our idea was to provide a dual entry into amateur radio. A Basic HF license could be comparable to the present Novice class, and the Basic VHF license could be similar to the Technician—both entry level. A licensee would have to hold both the HF and VHF basic classes to upgrade to the General class. The restructuring is a bit more complicated than that, but that is the general concept.

Ray answered my inquiry on October 5th. "You must realize that you are not talking about a simple proposal for a new feature of an operator's license," he wrote. "You are talking about altering the fundamental nature and character of the Amateur Radio Service. You are probably talking about a new class of operators, which, if it proves popular, could form its own organization and force further concessions. Will this be a world of technology-oriented operators who have heretofore been kept out of the service by the outmoded Morse requirement? Or will this be a world of band-trashers who will only accelerate the demise of amateur radio. Opinions will run high on both sides of the issue, but the only way to find out will be to try it and see what happens.

"Optimists, and I am one, can take great comfort in the fact that the administration of Canada has taken the first steps down the path of change. Obviously Ca-

Say You Saw It In CQ

nada has faith that the Amateur Radio Service will be better off with a structure that permits a codeless class of license. It appears to me that Canada has stepped back from the existing structure and asked, 'if the Amateur Service was just now being created, how would we license it?' By taking this approach, Canada has broken the bonds of telegraphy and brought one of the oldest radio services into step with the times. Isn't this the sort of initiative that would capture the imagination of the new administration in the United States?

"The process will be long and difficult. It must begin on two fronts: the preparation of a persuasive written petition for rule making and an evaluation of the FCC's willingness to accept it. . . . the most logical and meritorious of petitions on this subject can and will be summarily dismissed as 'repetitive' unless FCC personalities are persuaded that a significant faction of amateur radio is now in favor of such action."

Ray also said that previous efforts to restructure the U.S. Amateur Radio Service had been frustrated due to League politics. "The ARRL has its very roots in Morse traffic handling. The telegraphy point of view is so ingrained in the League that it is powerless to digress from it. To do so is to risk the wrath of the membership, all of whom survived their Morse hazing." Even so, Kowalski mentioned that he believed ". . . that had there not been a change in [FCC] bureau chiefs between the time that PR Docket 83-28 was begun (January 20, 1983) and resolved (December 14, 1983), the Amateur Radio Service would have had a no-code class of license."

It is interesting to note that the FCC reprogrammed their Gettysburg, Pennsylvania computers several years ago to issue Communicator Class licenses and automatic renewals—a form of lifetime license reportedly for Extra class amateurs. The present FCC Amateur Radio Service statistical report still shows provisions for these two changes which were never implemented.

During November I reproduced the four-page Kowalski letter and wrote a cover letter addressed to "Friends of Amateur Radio." I said that I had become very concerned about the future of amateur radio. "Well-funded outside interests are demanding additional frequencies and there is simply not enough spectrum to go around. Ham-band 'frequency attacks' have become a way of life!" I suggested that "it becomes apparent that amateur radio operators need to redirect their emphasis . . . from retaining our valuable spectrum, . . . to wider use of what we have."

I also expanded on the amateur radio restructuring that had been approved for Canada. "There seems to be a direct relationship between the quantity of amateur radio operators a nation has . . . and their number of engineers and technicians. Japan turns out more high-tech engineers per capita than any other nation. With half our population, Japan has four times as many licensed ham operators . . . more than 1.6 million.

"Amateur radio should provide spectrum for those interested—or those who could become interested—in our hobby. With a larger pool, many will go on to upgrade even further.

"The argument that Morse code knowledge acts as a filter to attract a higher quality individual is simply not valid and the requirement has the unhealthy side effect of keeping the number of ham radio operators low. Except for the code requirement, many excellent candidates would immediately become amateur radio licensees. In short, there is no relationship between code proficiency and being a desirable applicant. Amateur radio operators make up the same population cross section as any other group . . . some excel, some are disagreeable . . . most are good.

"The Amateur Radio Service has the spectrum, particularly at the reusable higher frequency bands, to support large numbers of operators. Newcomers, wishing acceptance, will follow the lead of present users. Chaos won't exist where it does not already exist. 'What you see is what you get' always holds true. CB radio degenerated into disorder because it lacked the demonstrated leadership, organization, and courtesy of the Amateur Radio Service."

I said the purpose of my letter was to ascertain whether you feel the time is appropriate to consider wider amateur use of our valuable frequencies. "We certainly are not suggesting amateur radio without rules, without training, or without examinations. The testing function will control growth. . . ."

I sent out inquiries to 500 prominent amateurs, publishers, and members of industry and said I would start an Amateur Radio Expansion Fund with a beginning balance of $1,000. I also sent out a copy of the *W5YI Report*, which clearly explained the new license classes that Canada was creating. I further indicated that I intended to petition the FCC for a new entry-level class of amateur license along the lines of the Canadian licenses. The response to a license of this type was immediate—particularly from industry. I retained Ray Kowalski to legally assist in developing an amateur radio restructuring proposal for the United States.

In the past, members of the amateur industry had suggested that perhaps some sort of "code recognition" examination could satisfy the ARRL-mandated code requirement. "Code recognition" involves identifying code characters—"a dot-dash is an A"—but not necessarily copying the text. That appears to be just a "face saving" measure—a means of pacifying the League, who had earlier taken a position that the code was a necessary prerequisite to any form of amateur operation. There isn't any international Morse code requirement for operation above 30 MHz, and I prefer the Canadian philosophy which totally removes any artificial impediments that are not directly related to the planned operation of newcomers. Again, telegraphy at the VHF and higher frequency range is just about totally absent, so why require it?

One of the individuals to whom we sent the "package" was Don Stoner, W6TNS. I remembered that Don had filed a petition some years back proposing a Digital Radio Service in the 6 meter band that would not require computer hobbyists to take a telegraphy examination. Even though RM-5241 was turned down, the FCC Commissioners suggested at their Open Meeting that he reapply for such a service at a higher spectrum level and they even went so far as to suggest the 902 MHz amateur band.

Basically the Canadian proposal would permit computer hobbyists to become amateur operators and communicate via radio instead of phone lines. Don liked the Canadian proposal and sent us a big donation to the Expansion Fund. He also offered to set up an organization that would publicize amateur radio to non-hams and support adoption of the Canadian propos-

CQ Reader Survey

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al in the United States. The National Amateur Radio Association was chartered in the state of Washington as a tax-exempt 501(c)3 educational/scientific organization.

All donations that were received were sent to Ray Kowalski to help fund the legal effort to restructure amateur radio in the United States. On December 2nd Ray Kowalski had a formal meeting with FCC Private Radio Bureau Chief Ralph Haller, N4RH. Haller said that any restructuring petition filed should have broadbased support—particularly within the amateur community.

ARRL To Survey Its Members

It now appears that the ARRL may be loosening up a little on their previous stance of required Morse code proficiency as a prerequisite for amateur band operation. ARRL Executive Vice President David Sumner, K1ZZ, and President Larry Price, W4RA, collaborated in writing an editorial entitled "Why Morse Code" for the January issue of *QST*, the ARRL monthly journal. They noted that in view of modern satellite technology Morse code use on the high seas could become a thing of the past. "Now that there are so many ways of communicating by radio that don't depend on the skill of the operator in sending and receiving Morse, will we soon see the end of Morse code in amateur radio?" they asked.

While stating that Morse code will always be important to amateur radio, Sumner and Price question whether "basic Morse code ability should be a requisite for each and every radio amateur, irrespective of their interests? Do the present Morse requirements separate the sheep from the goats, or do they simply let in fewer of each?" These are very good questions indeed!

The League said it had received dozens of responses to a reader letter it published last November maintaining CW was outmoded. The 13 letters that *QST* published all opposed relaxation of the telegraphy requirement. We also have been receiving letters, but curiously ours are running counter to those published by the ARRL. A greater majority of the responses we have received—many with checks attached—support some form of entry into the Amateur Radio Service without a telegraphy requirement.

Since it appears that the League is opening a debate on the pros and cons of retaining Morse code proficiency as a requirement for amateur band operation among its membership, we thought we would conduct our own survey among *CQ* readers. You will find a return card bound into this month's issue. We would like to have you complete this card and return it to us at *CQ*. It will give us an idea of how you feel about the situation.

Completing and returning this survey card is more important than you realize. These responses will be used to identify and document with the FCC that a change is indeed needed in the Amateur Radio Service entry-level requirements. Complete and mail this card to us today! Enclose an additional letter if you would like to comment further!

We also invite other amateur radio publications, club newsletters, and amateur radio groups to survey their readers/members. Send us your results! If our preliminary surveys are any indication, there will be a strong bias in favor of an entry-level amateur license.

If you would like to contribute to the legal effort to restructure the U.S. Amateur Radio Service to include a mechanism whereby individuals may participate in amateur radio without a demonstrated proficiency in Morse code, checks may be made out to the "Amateur Radio Expansion Fund" (P.O. Box 565206, Dallas, TX 75356).

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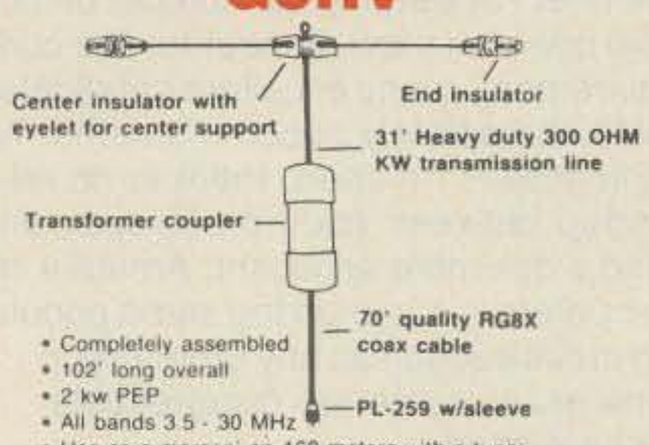

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TD-4010-2	40,20,15,10	57'	54.95
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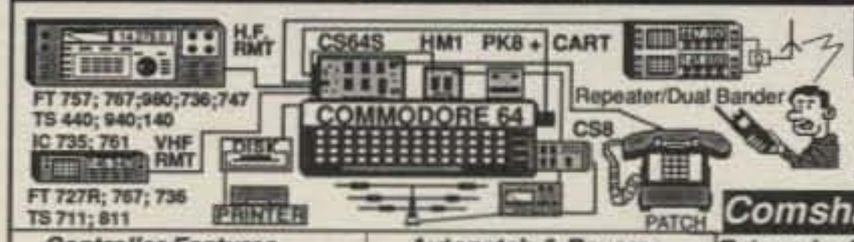

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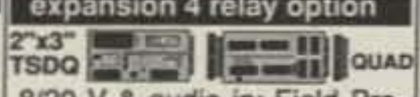

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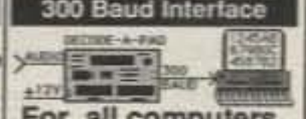

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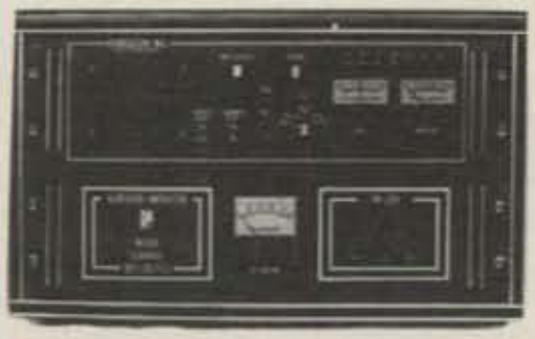

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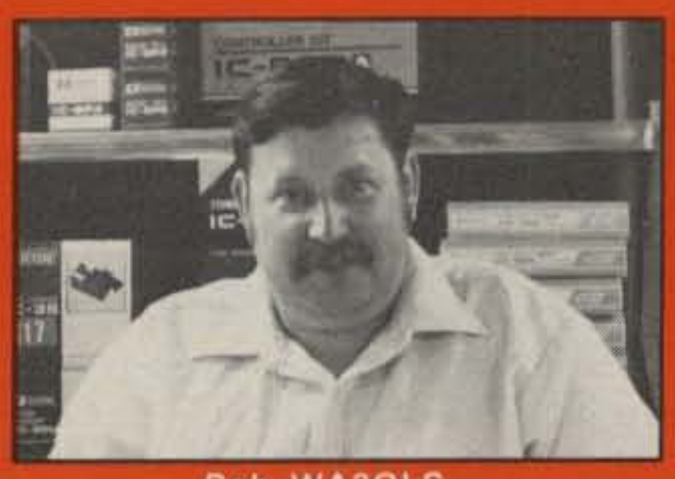

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The Packet User's Notebook

a feature by **BUCK ROGERS, K4ABT**

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

Net/Rom and User Commands

Last month we presented another advance in the technology of packet that gave us a means to build and customize our own gateways and nodes. We also constructed a dual-port packet system utilizing the Net/Rom firmware from Software 2000 and a pair of MFJ 1270Bs. This month we will pursue the use of these newly constructed gateways and nodes by learning the user commands that will enable us to use them in a very user-friendly way. Finally this month we will take a look at a "TURBO" high-speed system for moving traffic across busy LANs and congested metropolitan areas.

As Mike Busch, W6IXU, so aptly put it, "here is the guided tour" through the Net/Rom end-user commands. There are nine commands which are available to the remote sysop. Of these nine commands only five are needed by the end user to enjoy a new packet experience.

These five end-user commands are:

CONNECT
CQ
USERS
IDENT
NODES

The task of remembering all the routes to the other LANs in your area is a thing of the past. With the Net/Rom a connect to a distant station can be reduced to as few as three callsigns to remember. The Net/Rom has embedded into its code an algorithm which allows it to update the routing tables about once an hour. The updating is achieved through communications with other Net/Roms. They "swap ideas and routes," so to speak. One Net/Rom node can keep up with as many as 50 other nodes through the network of Net/Roms which surrounds each of them. In fact, I am able to use the local Net/Rom to connect with another network node in Mississippi, over 500 miles from my QTH.

CONNECT Command

With the **CONNECT** command we begin the scenario. My friend Ed, WD4HMR, lives in Birmingham, Alabama, about 300 miles west of me. Ed also operates packet on 145.670 MHz. I operate on 145.010 MHz in Warner Robins, Georgia. I connect to the local Net/Rom, ABT8 (alias of K4ABT-8). From the node lists I have seen from the Net/Rom nodes before, I know that BHM2 (alias of K4HAL-2) is on 145.670 MHz in Birmingham. The fact that it is on another frequency makes no difference to me. Since BHM2 appears in the node list of the local network node, I am confident that the local node has the route to it, and that BHM2 can be reached from the local node. Without typing in a lot of additional digis and their routes, I type the following:

C BHM2 <enter>

In less than 30 seconds (40 seconds on a busy night) I see on my screen:

***** connected to BHM2** / K4HAL-2

My next input is to connect to Ed, WD4HMR, who monitors the 145.670 LAN in Birmingham, Alabama. I simply enter:

C WD4HMR <enter>

and the next thing I see is:

***** connected to WD4HMR**

If for any reason Ed has turned off his station or the channel is too congested in Birmingham to allow the connect, I will receive a "Failure with WD4HMR" message. Notice here that I am still connected to node BHM2. This allows me to try a connect to Hop Hayes, K4TQR, who also monitors the 145.670 node.

CQ Command

(First note that the CQ command is available in version 1.3 of Net/Rom!)

Here is a command that has been needed for a long time. If only to be able to explore the other LANs, it is well worth having.

The scenario: I am connected to a network node in a distant city or state, and I do not know anyone there who is on packet. I need to attract someone's attention so I can send traffic through to that LAN. This is the way it works.

I enter my name and a short message in this manner:

CQ CQ "Buck" in Warner Robins, Ga. I have message for your LAN. *(Up to 77 characters in length)*

After displaying my call to the distant LAN, the **CQ** stays active for 15 minutes. At this point anyone who sees the message can connect to the callsign they see displayed at the distant node end. The callsign will usually have a "Translated" SSID attached. The translated SSID is added by the network node.

USERS Command

While connected to the distant node, you may want to see if any other station is trying to call CQ. To do so, issue the **USERS** command. If there are other stations connected to the node in the CQ mode, you will receive this reply:

Circuit (NOD:callsign-?) <..> CQ (ANYCALL-15)

You can connect to CQ callsign by issuing **C ANYCALL-15**.(ANYCALL = the callsign of the CQ mode connected station.)

The **USERS** command will allow you to see the callsigns of other users of the node and the callsigns of the stations to which they are connected. You may see something like this when you issue the **USERS** command to the connected network node:

USERS
ABT8:K4ABT-8} NET/ROM 1.3
Uplink (WB4LOT-5)
Circuit (ABT3:K4ABT-3 N4NAU)
Uplink (WD4JKH)

This will give you a vehicle to discover the callsigns of stations in the distant LAN.

IDENT Command

This command will return the sysops call and SSID, and the alias callsign of the node to which you are connected.

NODE Command

While connected to the Net/Rom node, issue the **NODE** command and you will receive a list of all the nodes that can be

506 Pheasant Ridge Drive, Warner Robins, GA 31088

Say You Saw It In CQ

ABT9:K4ABT-9 >Nodes:

ABY1:W4MM-1	ABY2:W4MM-2	BHM2:K4HAL-2
BHM4:K4HAL-4	ACK:NO5N-1	ALA1:K4HAL-1
ALA5:K4HAL-5	HSV2:W4HFU-2	HSV4:W4HFU-4
MGY:W4AP-2	MGY4:W4AP-4	PRY1:KJ4ZI-1
QIT:W4FGH-1	TCL1:W4KDP-1	TCL3:W4KDP-3
TCL4:W4KDP-4	THO2:WD4JKH-2	THO1:WD4JKH-1
TLH1:W1EOH-1		

Fig. 1 - While connected to the Net/Rom node, issue the NODE command and a list of all the nodes that can be called from the connected node, which will be a list of the nodes in its routing tables, will appear and look similar to the above.

called from the connected node. This will be a list of the nodes in its routing tables. The list will appear similar to that shown in fig. 1. Faster than a speeding bullet!

Now let's explore the world of speed with regards to packet. This portion of "The Packet User's Notebook" will cover the advances made in the very high-speed packet arena. Here is a brief explanation by Gary Coffman, KE4ZV. This system was designed by Dale Heatherington, WA4DSY, and is now in use here in the southeast with the hub in Atlanta.

Another era in packet communications has begun with the entrance of the 56 kilobaud high-speed modem. At this writing the system is being pioneered and distributed by Georgia Radio Amateur Packet Enthusiasts Society (GRAPES) Inc.

At a data rate of 56000 bps, the modem occupies less than 70 kHz of bandwidth. The measured bandwidth is 1.2 Hz per baud as compared to traditional 1200 baud AFSK, which uses about 12 Hz per baud for a bandwidth savings of about 10 times. The baud rate of the modem is selectable from 56 kb down to 9.6 k. A baudrate of 14.4 kb will occupy a standard FM voice channel on 2 meters, and on the higher frequency bands the full 56 kilobaud capability can be exploited. The modem is crystal controlled in the 28 to 30 MHz range with 1 milliwatt of RF output. This is suitable for driving a transverter to the VHF or UHF frequency of your choice. Currently we in Atlanta are using the 430 MHz band with Microwave Modules MMt432s transverters.

Building and tuning up the modem requires only modest skills and a minimum of test equipment. Although members of GRAPES have access to sophisticated spectrum analyzers and signal generators, the only piece of test equipment necessary to tune up the modem is an oscilloscope with XY display capability.

The modem consists of three silkscreened double-sided circuit boards. The encoder board uses a sin/cos lookup table in ROM to drive two digital-to-analog converters. This converts the digital data to a pair of quadrature phased signals that drive the balanced modulators on the RF board. The transmit side of the RF board consists of a crystal oscillator and a pair of 1496 balanced modulator chips followed by a LM733 output stage. The receive section of the RF board consists of a crystal oscillator and an FET mixer driving a 10.7 MHz filter. The output of the filter drives a single-chip receiver, the MC3359, which uses an LC filter at 455 kHz for final bandpass. The quadrature detected signal is sent to the decoder board where the tracking data detector, NRZI to NRZ converter, and clock recovery circuits bring our signal back to digital data. A randomizer is used in the encoder and a derandomizer is used in the decoder to assure a smooth spectrum.

The biggest problem with a 56 kilobaud modem is finding something that can send and receive packet data fast enough to drive it. We are using Phil Karn, KA9Q's TCP/IP running on a PC clone driving a specially modified version of the KISS TNC. This works okay, but we are currently exploring cards such as the Eagle card and the DRSI card, which directly plug into the PC bus. Other driver cards that plug into the PC bus are under development, and the PS186 board may work as a stand-alone switch. A simple TNC does not have the horsepower to both drive the modem and serial link while doing the AX25 protocol as well.

With 47 times the throughput of a 1200 baud link, the high-speed modem makes inter-LAN communication seem like local communication. Oftentimes I am not even aware that the station connecting to mine resides in another LAN. With TCP/IP, I do not need to know the path that my packets take to reach their destination. The switch makes those decisions for me.

When I am talking to a station running only link-level code, I do have to add the digipeat string to the connect request, but the switch code we are running still transparently selects the right trunk to send my packets toward their destination.

For users not running networking software, the switch works as a multiport digipeater. The switch has static tables that reroute frames based on digipeater callsigns or destination callsigns. The digi call following the switch's callsign in the header is examined to see if it is in the table. If it is, the switch routes the frame out the appropriate port to reach that digi.

Example: WA4FIB via W4QO-1, KD4NC-1. The switch recognizes KD4NC-1 as a digi that is reached via the high-speed link and switches the frame to the port driving the high-speed modem. In certain specialized cases, such as the BBS and users running high-speed modems at their homes, the switch needs to look at the destination call and intelligently route the frame out the appropriate port.

Example: W4QO via W4QO-1. Normally, a frame like this would be repeated on the LAN frequency, as there are no digi calls following the switch's call in the digi string. However, W4QO is in the exception table, and the frame will be routed out the port connected directly to the BBS instead of being repeated on the LAN. All of this is handled automatically for the user, and the user can think of the system as if it were on the same frequency. All switching is done transparent to the user.

The major benefits are that digipeated

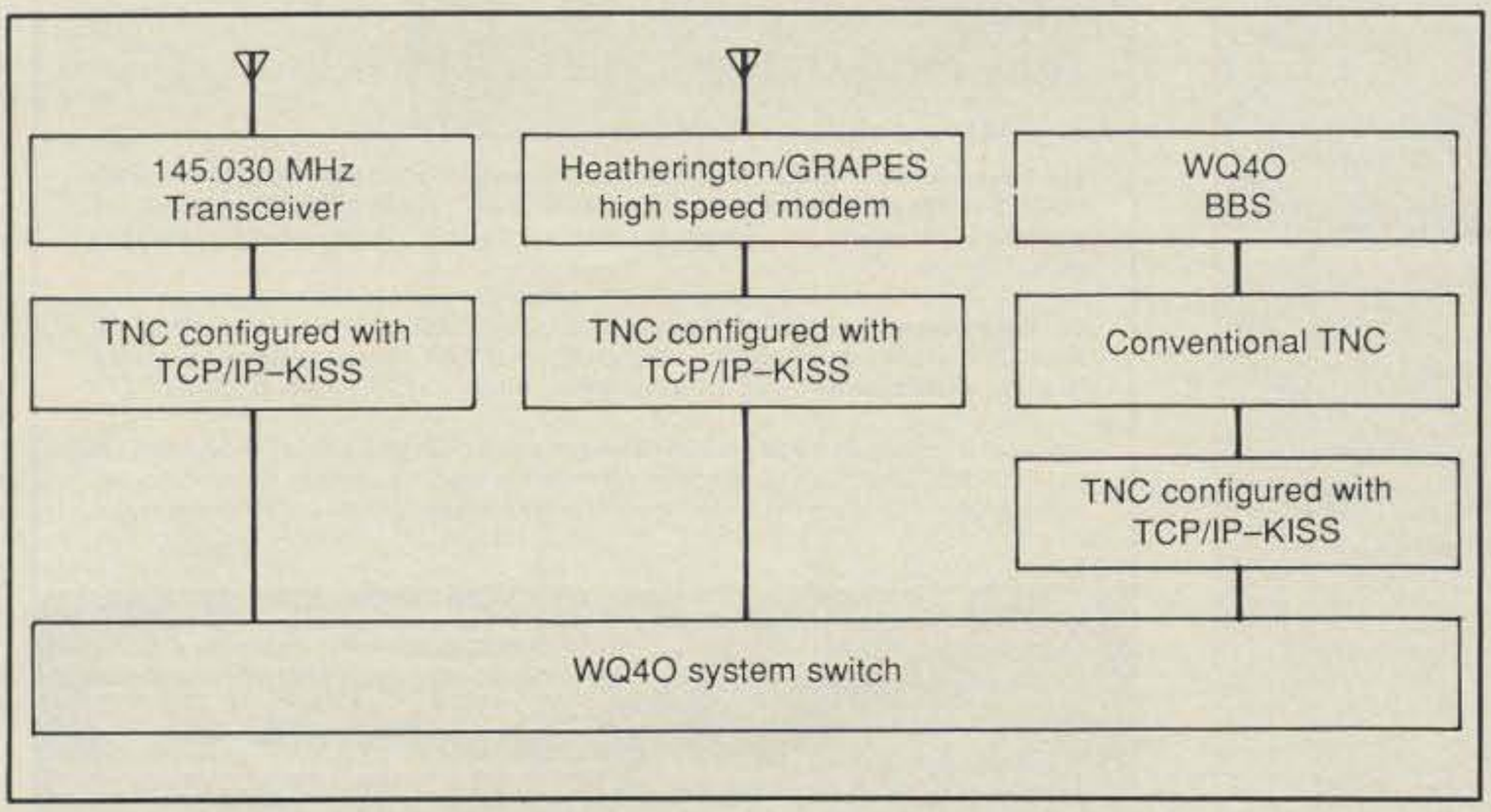

Fig. 2 - This drawing depicts the LAN configuration to utilize the high-speed modem.

No -79-80

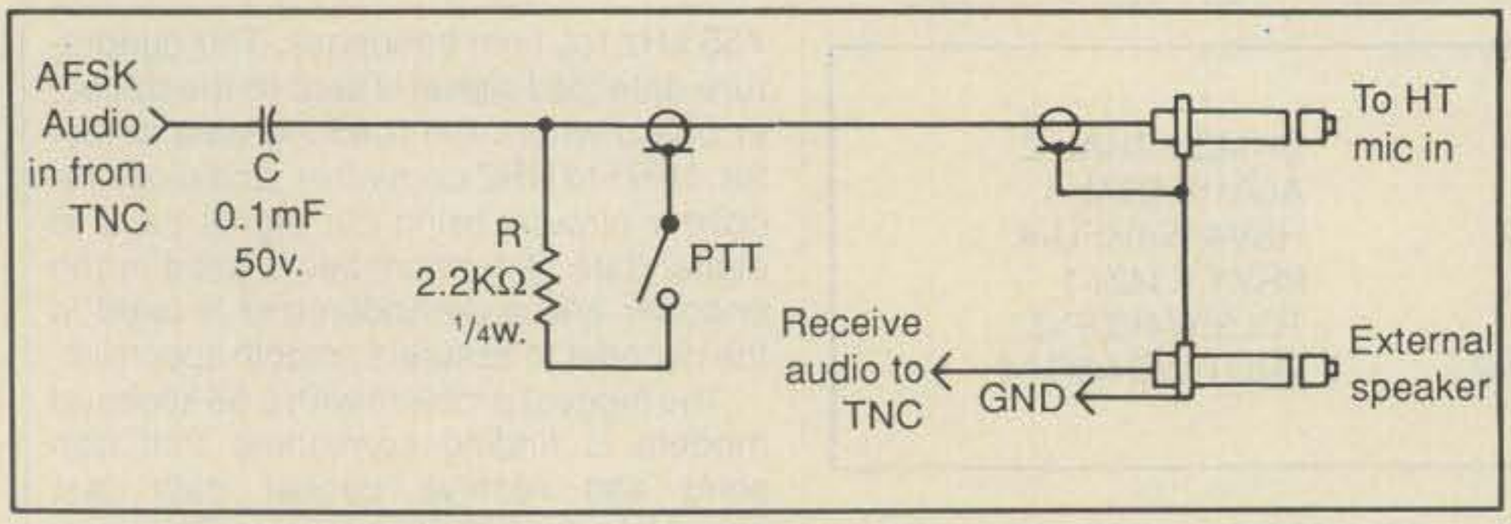

Fig. 3- For the notebook, here is the TNC interface for the Yaesu FT-209, FT-709, FT-727, FT-23/73 handhelds.

frames are moved to another link so congestion is removed from the LAN frequency, and connectivity to other LANs is available to the users who cannot operate directly on the other LAN frequency due to distance or equipment limitations. (See fig. 2.)

I would like to add this thought: The 56kb Heatherington modem has allowed packet operation in the congested Atlanta metropolitan area to survive as a viable amateur operating mode without requiring the user to take exotic steps at his home station. We have not yet been forced to move the user off 2 meters to find a suitably uncongested channel for his operations.

The 56kb modem is currently being distributed as a kit by GRAPES. The kit includes all electronic components, documentation, and a disk with support software. Not supplied are a cabinet, power supply, and transverter. All proceeds from the sale of the kits go to the GRAPES network fund to support the implementation of more high-speed networks. An information flyer and order form are available from Grapes. Their address is: Grapes Inc., P.O. Box 871, Alpharetta, GA 30239-0871.

Special thanks for assistance and information with this month's "Packet User's Notebook goes to: Dennis Barrow, WB4GQX; Mike Busch, W6IXU; Gary Coffman, KE4ZV; Doug Drye, KD4NC; Hop Hayes, K4TQR; Dale Heatherington, WA4DSY; Phil Karn, KA9Q; and Henry Wingate, K4HAL. Until next month, *** disconnected es I hope to see you in Orlando.

Correction For February Column

The following modification is required for TNCs that will be used in dual- or multi-channel Net/Rom configurations. Since it does not impair normal operation in any way, we recommend it for all TNCs to be used with Net/Rom. You may want to upgrade to dual-channel operation later.

To make this modification, connect one end of a wire to pin 23 of the RS232 connector. Connect the other end of the wire to pins 1-2-3 of JMP9 (these three pins are already hooked together on the circuit board). This modification allows the Net/Rom firmware to be configured for multi-channel operation by jumpering RS232 pins 10 and 23 together in the TNC-to-TNC cable.

73, de BucK4ABT

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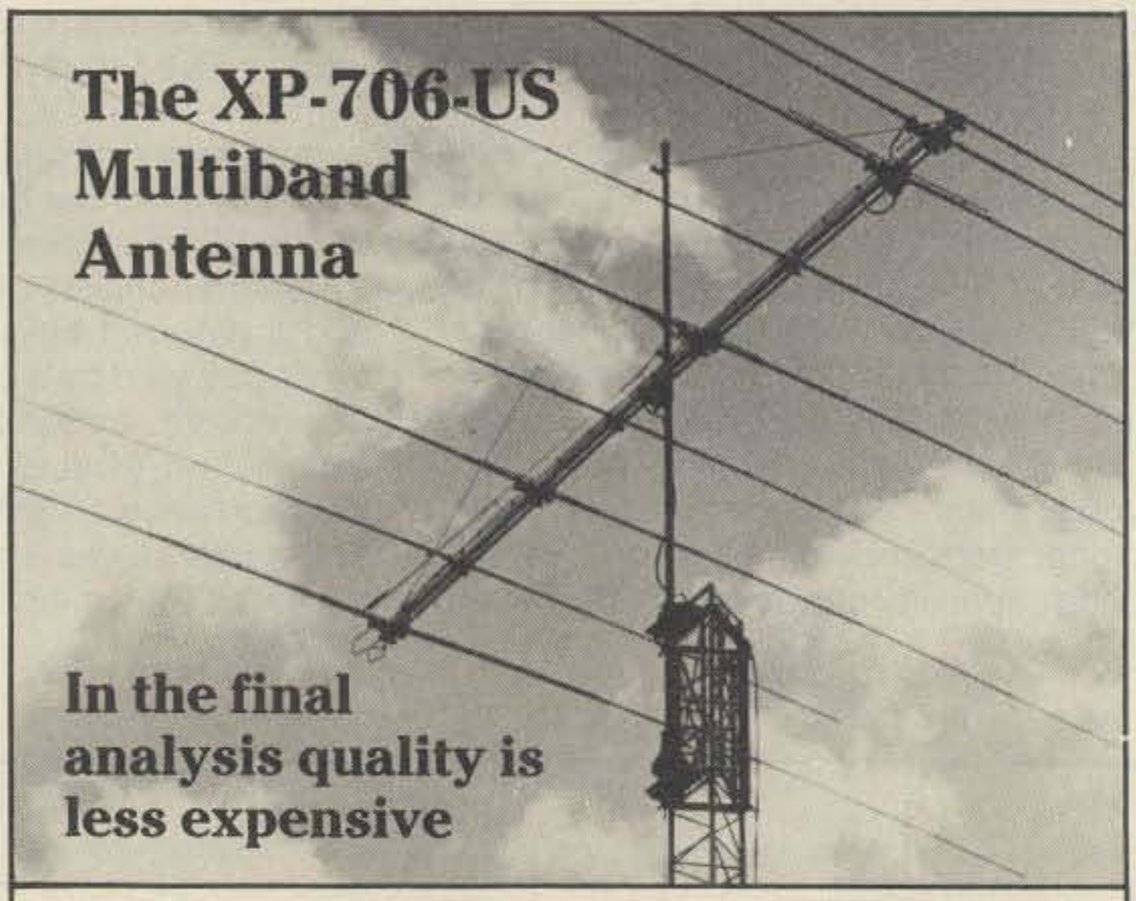

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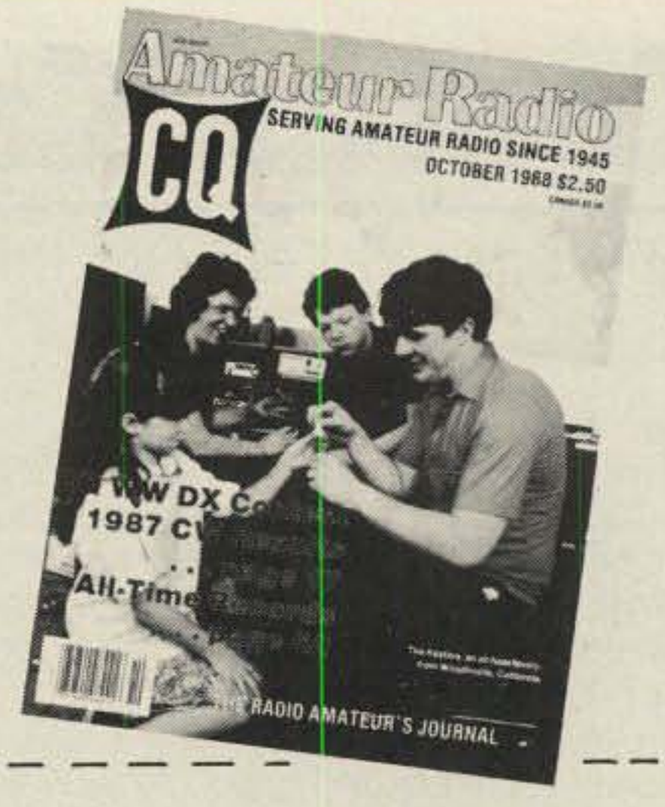

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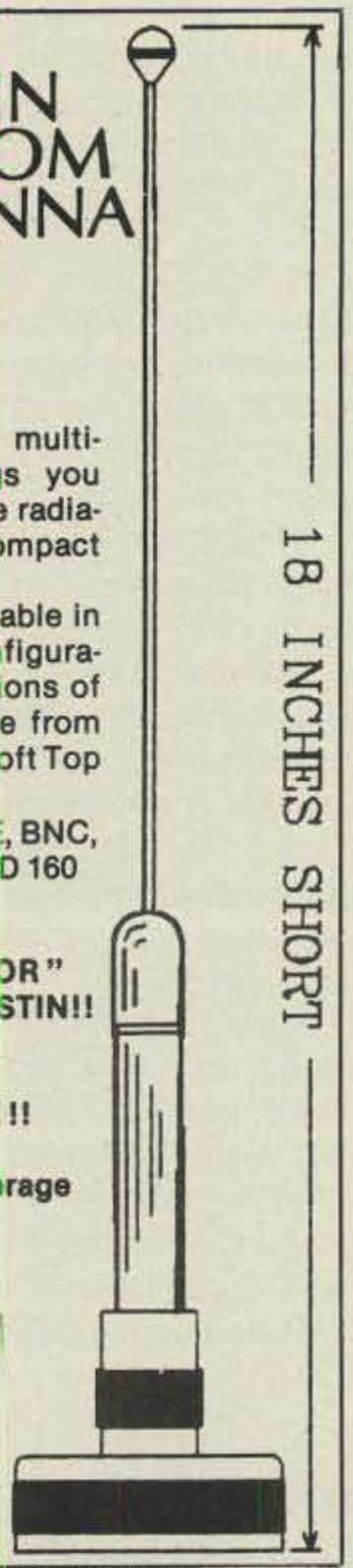

CIRCLE 124 ON READER SERVICE CARD

Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

This month we are sorry to say that Frank's sage advice and contest editorial will be missing from this column. Frank has been ailing lately and unable to write the editorial comments. He has, however, compiled all the contest information in the column. We wish Frank a speedy recovery and hope to have him back at the typewriter next month.

—K2EEK

U.B.A. (Belgium) Contest

SSB: Feb. 25-26
1300Z Saturday to 1300Z Sunday

Organized by the Union of Belgian Amateurs, the CW section of the contest took place January 28–29. Rules are the same for both sections.

Classes: Single operator, single and all band. Multi-operator, single transmitter, all band only. QRP, 10 watts. And SWL.

Bands: All five bands, 10–80 meters according to IARU band plan for Region 1.

Exchange: RS(T) and QSO number starting with 001. Belgians will include their province. There are 9 provinces: AN, BT, HT, LB, LG, LU, NR, OV, WV.

Scoring: QSOs with ON, DA1, and DA2 count 10 points. With European communities 3 points (CT, CU, DL, EA, EA6, EI, F, G, GD, GI, GJ, GM, GU, GW, I, IS, LX, OZ, OY, PA, SV, SV5, SV9, SY, TK, ZB2). All other countries 1 point. Own country can be worked once per band for QSO credit.

Multiplier: Belgian provinces, 9 per band. Belgian prefixes, 8 per band. European communities, 26 per band.

Final Score: Total QSO points times the total multiplier from each band (maximum of 43 per band).

Awards: The new "UBA Award" to the highest scoring station in each class in each country. Certificates to other participants. There are other special awards. The Worked ALL Belgian Provinces Award for contacts with all provinces on two different bands is available without proof of QSL cards.

Use a different log sheet for each band. Include a summary sheet showing the scoring, off periods, and other essential data. The usual signed declaration is also requested.

All entries must be postmarked no later than 30 days after the end of the contest and go to: UBA HF Contest Committee, Att: Galicia Jan, ON6JG, Oude Gendaraeriestraat, 62, B-3100 Heist op Den Berg, Belgium.

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

†	**Feb.**	**24-26**	**CQ WW 160M SSB Contest**
*	Feb.	25-26	French SSB Contest
	Feb.	25-26	UBA SSB Contest
*	Feb.	25-27	YLRL YL/OM CW Contest
*	Mar.	4-5	ARRL DX SSB Contest
*	Mar.	11-12	QCWA SSB QSO Party
	Mar.	11-12	Iowa QSO Party
	Mar.	12	ZERO District QSO Party
	Mar.	12	M-QRP-C Classic Sprint
	Mar.	18	YLRL "East Meets West"
	Mar.	18-19	Bermuda Contest
†	Mar.	18-19	YL-ISSB SSB QSO Party
	Mar.	18-20	BARTG Spring RTTY Contest
	Mar.	18-20	Virginia QSO Party
	Mar.	19-20	Wisconsin QSO Party
	Mar.	**25-26**	**CQ WW WPX SSB Contest**
	Apr.	8-9	ARCI QRP CW QSO Party
	Apr.	8-9	MARC County Hunters SSB
	Apr.	12-14	YLRL DX/YL to NA/YL CW
	Apr.	15-16	IBM QSO Party
	Apr.	19-21	YLRL DX/YL to NA/YL SSB
	Apr.	22-24	Connecticut QSO Party
	Apr.	29-30	Swiss Helvetia Contest
	May	6-7	MARC County Hunters CW
	May	20-22	Michigan QSO Party
	May	**27-28**	**CQ WW WPX CW Contest**
	May	28	ARCI QRP CW Sprint

* *Covered last month.*
† *See January issue.*

Iowa QSO Party

1800Z Sat. to 0600Z Sun., March 11–12

This is the fifth annual Iowa QSO Party. The same station may be worked on each band and mode for QSO and multiplier credit. No repeater QSOs.

Exchange: RS(T) and QTH. County for Iowa stations; ARRL section or country for DX.

Scoring: Count 1 point for phone contacts, 1.5 for CW, 3 for Oscar, and 5 points if with a Novice/Tech.

Iowa stations multiply total QSO points by sum of ARRL sections and Iowa counties worked.

Others total QSO points by the number of Iowa counties worked (maximum of 99).

In addition, there is a bonus multiplier for each Iowa Section Official worked (maximum of 8).

Frequencies: CW—1810, 3550, 7050, 14060, 21050, 28050. Phone—3875, 7225, 14275, 21325, 28600, 50110, 144.200, 146.520. Novice—10 kHz from low edge of Novice bands.

Awards: For Iowa stations, mobiles, and clubs, and also for out-of-state winners.

Mailing deadline for logs is April 1st to: Bob McCaffrey, KØCY, RR#4, Box 228C, Boone, IA 50036.

Zero District QSO Party

1800Z to 2400Z Sunday, March 12

This year's party is being sponsored by the Davenport RAC of Iowa.

Stations outside the zero district will be contacting zero stations only. Zeros may work anyone. The same station may be worked on each band and mode, mobiles in each county change.

Exchange: RS(T) and state. Zeros will also include their county.

Scoring: Phone QSOs count 1 point, CW contacts are worth 2 points; 4 points for Novice CW contacts. Zeros multiply total QSO points by (states + VE provinces + DX countries + zero counties) worked for their final score.

All others use zero counties for their multiplier. QSO with WØBXR is worth 2 bonus multipliers regardless of mode.

Stations making over 100 QSOs must include a dupe sheet with their log.

Frequencies: CW—60 kHz up from low edge of each band. Phone—3900, 7270, 14300, 21350, and 146.52. Novice—3730, 7130, 21130, and 28360.

Awards: Certificates to winners in a variety of categories, depending upon the number of entries received. There is a special award for zero district clubs (minimum of 3 logs from members of the club required).

Mailing deadline for logs is April 30th to: Davenport RAC, WØBXR, 5305 White Post Road, Bettendorf, IA 52722. Include an SASE for a copy of the results.

M-QRP-C Classic Sprint

2000Z to 2400Z Sunday, March 12

This shorty is sponsored by the QRP ARCI Club. There are three classes: (A) Up to 1 watt output, (B) up to 5 watts output, and (C) over 5 watts output.

Exchange: RS(T) and state, province, country, and power output.

Points: 5 points per contact.

Multiplier: Total of states, provinces, and DX countries worked on each band. The same station may be worked on each band for QSO and multiplier credit.

Bonus: If classic equipment (15 years

Say You Saw It In CQ

Doug Bender, WW6D (left), past president of the Redwood Empire DX Association, presenting plaques to Bruce Butler, W6OSP (center), and Lyle Meek, WW6F (right), for their operation at VP5W in the 1987 CQ WW CW Contest. The occasion was at the club's annual Christmas party. (Photo by Chod Harris, VP2ML)

old or older) is used—TX +200, RX +300, TCVR +500.

Final Score: QSO points × S/P/C multiplier + Bonus points.

Frequencies: 1810, 3560, 3710, 7040, 7110, 14060, 21060, 21110, 28060, 28110, 50060 kHz on CW. And 3985, 7285, 14285, 21385, 28385, 28885, 50885 on phone.

Entries with over 100 contacts are required to include a dupe sheet.

Awards: Certificates to top scorers in each state, province, and DX country and class, and top score in each single band.

Sample log and summary sheets are available from N8CQA. Include a large SASE with your request, and also for a copy of the results.

Mailing deadline is 30 days following the end of contest. Send to: Buck Switzer, N8CQA, 654 Georgia, Marysville, MI 48040.

East Meets West SSB Contest

1800Z to 2200Z Sat., March 18

This one is sponsored by the YLRL and is open to YLs only. East works West, and vice versa. The same station may be worked once on each band. No cross band, net, or repeater contacts allowed.

Those considered "East" are 1st, 2nd, 3rd, 4th, 8th, and 9th call areas; VE1–3; Europe; Africa; South America; Caribbean; and Central America (except Mexico). "West" are 5th, 6th, 7th, 10th, KL7, and KH6; VE4–Ø; Asia; Oceania; Australia; New Zealand; and Mexico.

The maximum power output that may be used at any time during the contest is 1500 watts PEP.

Exchange: RS, QSO number, name, and state, province, or country.

Scoring: One point for each different YL contacted on each band (no multiplier).

Frequencies: 3955, 7255, 14265, 21395, and 28395. Plus or minus 15 kHz.

Awards: Winners will receive YLRL postcards.

Print or type original log and check for duplicate contacts. The operator's signature is required.

Logs must be received by April 18th and go to: Carol Shrader, 4744 Thoroughgood Dr., Virginia Beach, VA 23455.

Bermuda Contest

0001Z Sat. to 2400Z Sun., March 18–19

This is the 31st year for this popular contest open to amateurs in the United States, Canada, the United Kingdom, West Germany, and Bermuda.

Stations in the U.S. and Canada may work the U.K., West Germany, and Bermuda. The U.K. and West Germany may work the U.S., Canada, and Bermuda. Activity will be on the 3.5, 7, 14, 21, and 28 MHz bands. Cross-band or cross-mode contacts are not permitted. The same station may be worked on each band, phone and again on CW, providing there is a 30-minute separation between contacts on the same band.

You are limited to 36 hours out of the 48-hour contest period. Off times of no less than three consecutive hours must be clearly indicated on the log. Participa-

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tion is for single operator stations only and must be from their own residence.

Exchange: RS(T) and QTH. Parish for VP9, state for the U.S., province for Canada, county for the U.K., and DOC number for West Germany.

Scoring: Five points for each QSO. Multiply total by number of different VP9 stations worked on all bands. (Note: It's each VP9 station, not each parish.) Counted once only per band regardless of mode used.

Awards: Certificates to top scoring stations in each U.S. state, VE province, U.K. county, and DL DOK (minimum of 100 QSOs). The overall winner in each of the above countries, however, will receive something more substantial—a trophy to be presented at the Society's Annual Dinner in Bermuda in October. Round-trip transportation and hotel accommodations will be provided for the winners. (Note: Winners in '84, '85, '86, '87 and '88 are not eligible.)

Use a separate log sheet for each band and a dupe sheet for logs with 200 or more contacts. A penalty of three contacts will be deducted for each duplicate contact for which points are claimed. An excessive number of claimed duplicates means disqualification. The usual signed declaration is also required.

Entries must be received no later than June 1st by the Radio Society of Bermuda, Box HM275, Hamilton HM AX, Bermuda.

The Worked All Bermuda Award can no longer be obtained by contest log information. Proof of contact with all nine parishes is required in the form of QSL cards. Send your application to the above address attention the Awards Manager.

Trophy winners in the 1988 contest were W1HJT, VO1MP, G4YLO (YL), and DK5EZ.

1988 BARTG North America Results

Single Opr.

TG9VT	1,030,160	W8LNK	89,862
WB5HBR	649,908	W0HAH	89,558
K6WZ/0	462,852	W3KV	88,440
NT0V	460,528	HP1AC	86,800
K7LXC	404,984	W8PBX	75,240
W0WP	399,632	VE7DTA	62,712
AB0Y/4	367,092	VE3ST	48,236
AA5AU	360,640	W2JGR	40,078
VE6ZX	337,343	WA8FLF	35,224
AL7BB	320,394	KD2HE	34,074
N6GG	314,292	WA9FBV	33,852
W6JOX	278,214	WB2CHO/6	21,480
N9CCI	271,260	KA1LMR	21,084
G0AZT/W6	275,060	VE7VP	17,240
KE0KB	263,190	WA3JXW	5,040
KI4MI	257,868		
W7MI	248,818	**Multi Op.**	
W5HEZ	183,616	WA7EGA	1,143,296
KA1GET	167,832	NG7P	1,081,880
WB4UBD	145,026	KT1N	1,024,974
AI7B	142,426	4U1UN	475,300
WA6WGL	141,700		
W3FV	123,660	TG9VT was World High	
WB6ZHN	109,120	Single Opr.	

Multiplier: Total number of countries worked on each band and number of continents worked (continents are counted once only). W/K, VE/VO, and VK call areas will be counted as separate multipliers.

Final Score: (a) Total QSO points × country multiplier. (b) Country multiplier × bonus points × continents worked. Add sum of (a) and (b) for your final score.

Shortwave listeners must show call of station being heard, report of message being sent, and call of station being worked.

Awards: Certificates to the top-scoring stations in each class and to the continental leaders. Also in each W/K, VE/VO, and VK call area.

Use a separate log sheet for each band and a summary sheet showing the scoring, etc. Log forms are available from G6LZB; include 6 IRCs to cover postage.

Logs must be received by May 27th and go to: Peter Adams, G6LZB, 464 Whippendell Road, Watford, Herts. England WD1 7PT.

BARTG Spring RTTY Contest

0200Z Sat. to 0200Z Mon., March 18–20

This contest is sponsored by the British Amateur Radio Teleprinter Group and is being administrated by Peter Adams, G6LZB. The contest is open to all amateurs in three classes—single operator, multi-operator, and SWL.

Activity will be on all bands 3.5–28 MHz, but no 10 MHz. Operation is limited to 30 hours out of the 48-hour contest period. The 18 hours off may be taken at any time, but not less than 3-hour periods.

Exchange: RST plus a three-figure contact number and time in GMT (full four figures).

Points: Contacts with stations within own country 2 points. With stations in other countries 10 points. And a bonus of 200 points for each country worked on each band including your own. The same station may be worked on each band for QSO and multiplier credit.

Virginia QSO Party

1800Z Sat. to 0200Z Mon., March 18–20

This is the 14th year the Sterling Park ARC has sponsored this party. The same station may be worked on each band and each mode for QSO credit. VA stations may work other in-state stations for QSO and multiplier credit. And VA mobiles in each county change.

Exchange: QSO number starting with 001 and QTH. County for VA; state, province, or DX country for others.

Scoring: One point for phone contacts; two points if on CW, RTTY, SSTV, or packet.

VA stations multiply total QSO points

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by sum of US states, VE provinces, DX countries, and VA counties.

Others multiply total VA QSO points by the number of VA counties worked (maximum of 95).

Frequencies: CW—60 kHz up from low end of 10, 15, 20, 40, and 80 meter bands. SSB—3930, 7230, 14285, 21375, 28375, 28575. Also Novice CW bands, and both modes on 160.

Awards: Certificates to top scorers in each state, province, DX country, and VA county. There are five plaques as follows: top VA multi-mode, VA CW only, VA mobile, VA Novice/Tech, and top out-of-state station.

Logs: Indicate each new multiplier in a separate column as it is worked. Include a summary sheet showing the scoring and other pertinent information.

Mailing deadline for all entries is April 15th to: Virginia QSO Party, c/o Richard Maylott, W4LMJ, 200 Lake Drive, Sterling, VA 22170.

Wisconsin QSO Party

1800Z Sun. to 0100Z Mon., March 19–20

This one is a shorty, only 7 hours, and it is again sponsored by the West Allis Radio Amateur Club.

The same station may be worked on each band and mode, and mobiles in each county change. Wisconsin stations may contact other in-state stations for QSO and multiplier credit. Only one transmitter on the air at the same time.

Classes: Single operator and multi-operator, both fixed and mobile. And Novice/Tech, both single and multi-operator.

Exchange: QTH only. County for Wisc.; state or province for others.

Scoring: Phone QSOs count 1 point, 2 points if on CW.

Wisc. stations multiply total QSO points by (U.S. states + VE provinces + Wisc. counties) worked for their final score. DX contacts count for QSO points only.

Others use total Wisc. QSO points by the number of Wisc. counties worked (maximum of 72).

Wisc. mobiles can add a bonus of 500 points to their final score for each county outside their own from which they operate (minimum of 15 QSOs from each county). Add 100 bonus points for using original entry forms or photocopy.

Frequencies: CW—3550, 3725, 7050, 7125, 14050, 21150. SSB—3890, 7290, 14290, 28400. Other bands may be used.

Awards: To highest scoring single operator in each class in each state and province. Plaque to the top-scoring station in the party.

Wisconsin: To 10 top single operator scorers in each class. Highest multi-operator in each class. Highest aggregate club score.

Logs with more than 100 QSOs must include a separate dupe sheet for each mode with their entry.

Complete rules and entry forms are available from address below. Include a large SASE.

Mailing deadline for logs is April 15th to: West Allis RAC, P.O. Box 1072, Milwaukee, WI 53201.

CQ World-Wide WPX Contest

SSB: March 25–26 CW: May 27–28
Starts: 0000Z Sat. Ends: 2400Z Sun.

Complete rules were published in the February issue. They are the same as those used last year with the same format that has been in use these past many years. Therefore, it would serve little purpose to repeat them again, since they are well established world-wide. Following are a few points to keep in mind.

Only 30 hours out of the 48-hour contest period may be used by single operator stations. Off times can be taken in up to five periods, but off periods must be a minimum of 60 minutes in length. Multi stations can operate the full 48 hours.

The QRP section has become very popular and is worth your attention.

The definition of the prefix multiplier is spelled out in detail and is now also being used for the *CQ* WPX Award program.

A prefix is the letter/number combination which forms the first part of a call.

Also bear in mind that stations in call areas different than that indicated by their call signs are required to sign portable.

The multiplier is determined by the number of different prefixes worked and is counted *once* only, regardless of how many times it is worked on other bands.

Another point to keep in mind is that in the multi-operator, single transmitter category only one transmitter and only one band may be used during the same 10-minute period. Picking up a new multiplier on another band during the same time period is definitely prohibited.

An alphabetical/numerical check list of claimed prefixes is a requirement and must be included with your log.

An updated trophy and plaque awards list now shows over 40 awards. Be sure to check the awards that are available.

Deadline for submitting your SSB entry is May 10th, and July 10th for the CW section. Be sure to indicate SSB or CW on the envelope.

All logs go to: *CQ* Magazine, WPX Contest, 76 North Broadway, Hicksville, NY 11801 U.S.A.

Questions pertaining to the WPX Contest can be sent to the WPX Contest Director, Steve Bolia, N8BJQ, 4121 Gardenview Dr., Beavercreek, OH 45431 U.S.A.

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CIRCLE 65 ON READER SERVICE CARD

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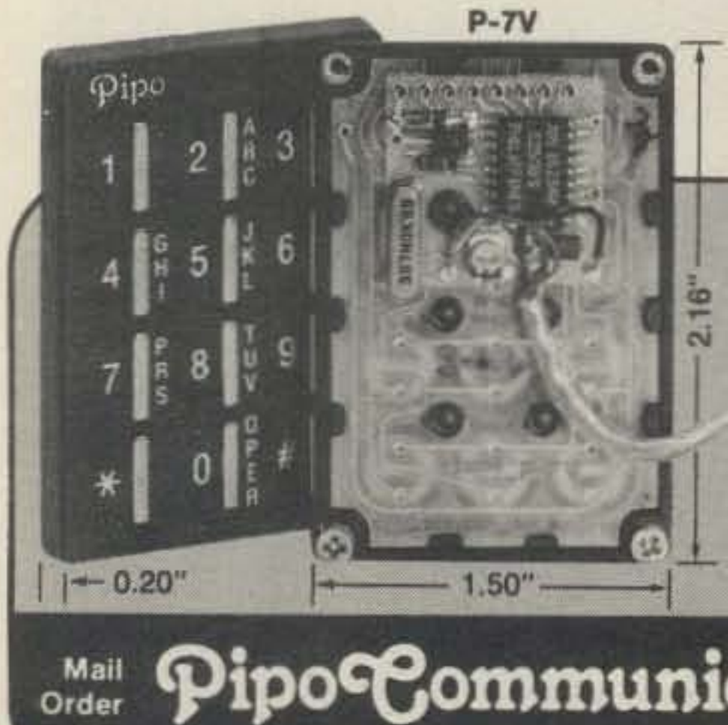

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CIRCLE 66 ON READER SERVICE CARD

ATTENTION: WOMEN WHO SOUGHT EMPLOYMENT WITH THE VOICE OF AMERICA (VOA), THE UNITED STATES INFORMATION AGENCY (USIA), OR THE UNITED STATES INTERNATIONAL COMMUNICATION AGENCY (USICA) BETWEEN OCTOBER 8, 1974 AND NOVEMBER 16, 1984.

YOU MAY BE A VICTIM OF SEX DISCRIMINATION ENTITLED TO A MONETARY AWARD AND A POSITION WITH THE AGENCY.

UNITED STATES DISTRICT COURT FOR THE DISTRICT OF COLUMBIA

CAROLEE BRADY HARTMAN, et al.,
Plaintiffs,

v.

CHARLES Z. WICK,
Defendant

Civil Action No. 77-2019
Judge Charles R. Richey

PUBLIC NOTICE

On November 16, 1984, the United States District Court for the District of Columbia found in this class action lawsuit that the United States Information Agency (USIA or the Agency), including the Voice of America (VOA), is liable for sex discrimination against female applicants for the following positions at the Agency. The USIA was also formerly known as the United States International Communication Agency (USICA). On January 19, 1988, the Court issued its opinion ordering relief in a variety of forms to potential class members. Accordingly, this case is now in the remedial phase.

JOBS COVERED

Specifically, the Court has found that the Agency has discriminated against women in hiring in the following jobs:

- Electronic Technician (Occupational Series 856)
- Foreign Language Broadcaster (Occupational Series 1048)
- International Radio Broadcaster (Other) (Occupational Series 1001)
- International Radio Broadcaster (English) (Occupational Series 1001)
- Production Specialist (Occupational Series 1071)
- Writer/Editor (Occupational Series 1082)
- Foreign Information Specialist/Foreign Affairs Specialist/Foreign Service Information Officer/Foreign Service Officer (Occupattional Series 1085 and 130)
- Radio Broadcast Technician (Occupational Series 3940)

WHO IS INCLUDED

All women who sought employment with the Agency in any of the jobs listed above between October 8, 1974 and November 16, 1984 and were not hired may be eligible for relief. Also included are those women who were discouraged from applying for these positions during that time period. Even those women subsequently hired by the Agency in some capacity may be entitled to participate in the remedial phase of this case.

Women who sought employment with the Agency as Foreign Service Officers or Foreign Service Information Officers may be eligible for different kinds of relief depending upon the date of application and whether they sought employment at the entry level or mid-level. Women who sought employment with the Agency as **entry** level Foreign Service Officers or Foreign Service Information Officers in the years 1974-1977 must use the procedure outlined below. Women who sought employment with the Agency as **mid-level** Foreign Service Officers or Foreign Service Information Officers in the years 1974-1984 must also use the procedure outlined below. However, women who sought employment with the Agency as **entry** level Foreign Service Officers or Foreign Service Information Officers in the years 1978-1984 cannot use the procedure outlined below, since the Court has ordered an alternative form of relief for them and selected women in this group will be notified individually as to their rights.

RELIEF AVAILABLE AND HOW TO OBTAIN IT

Relief available to class members may include a monetary award and/or priority consideration for a current position with the Agency. If you think you may be entitled to relief, you **must** obtain a claim form, complete it fully, and return it to counsel for the plaintiff class, Bruce A. Fredrickson, Esq., Webster & Fredrickson, 1819 H Street, N.W., Suite 300, Washington, D.C. 20006 (202/659-8515), postmarked no later than July 15, 1989.

You may obtain a claim form in person and/or in writing from several sources: counsel for the plaintiff class, whose address is listed above; in person from USIA, Front Lobby, 301-4th Street, S.W., Washington, D.C. (8:15am -5:00pm), Office of Personnel Management (OPM), Federal Job Information Center (First Floor, Room 1425), 1900 E Street, N.W., Washington, D.C. (8:30am-2:30p.m.), or from area OPM offices throughout the country; in writing, VOA-Hartman, P.O. Box 400, Washington, D.C. 20044. You should carefully consider all questions on the claim form, **sign** it, and return it to counsel for the plaintiffs. **Do not, under any circumstances**, return the claim form to the Judge, the Court or the Clerk of the Court. The Judge, the Court and the Clerk of the Court **will not accept** the claim forms and **will not forward** claim forms to plaintiffs' counsel.

PROCESSING OF CLAIMS

The process for handling claims has not been finally decided. Thus far, the Court has ordered that responding class members demonstrate their potential entitlement to relief at an individual hearing to be scheduled at a later date. However, the Court has reserved the right to reconsider this procedure in the event the number of claims filed makes this approach unmanageable.

Should individual hearings be used, you will be fully informed as to the date and time of your hearing. Moreover, you will be entitled to legal representation by counsel for the plaintiff class or his designee at no cost to you. Legal counsel will discuss your claim with you prior to your hearing, help you prepare your case and represent you at your hearing. You may, of course, retain your own attorney to represent you, if you so desire.

At the individual hearing, you will be asked to demonstrate your potential entitlement to relief by showing that you applied for one or more of the covered positions during the period October 8, 1974 and November 16, 1984 and that you were rejected, or that you were discouraged from applying. Evidence may be required in the form of testimony, documents, or both. Once you have demonstrated these facts, USIA is required to prove, by clear and convincing evidence, that you were not hired (for **each** position for which you applied) for a legitimate, non-discriminatory reason, such as failure to possess requisite qualifications. Should USIA make such a showing, you would then be entitled to demonstrate that the Agency's reason is merely a cover for sex discrimination or unworthy of belief.

Following the hearing, the Presiding Official will decide whether you are entitled to relief and, if so, what relief is appropriate. You may be entitled to wages and benefits you would have earned if you had been hired (back pay) from the date of your rejection until the date relief is approved. Under the law, back pay is offset by earnings you may have had during the period. In addition, you may be found to be entitled to front pay (that is, compensation into the future until an appropriate position is afforded you). Similarly, you may be found to be entitled to priority consideration for employment with the Agency. If hired, you may further be entitled to retroactive seniority with the associated benefits and the value of any promotions you would likely have had if you had not suffered discrimination.

REQUIRED STEPS TO FILE YOUR CLAIM

To participate in the remedial phase, **you must fully complete the claim form** and return it, POSTMARKED NO LATER THAN July 15, 1989, to counsel for the plaintiff class. Your failure to do so will result in your losing all rights you may have in this lawsuit. If you have questions about your rights or procedures available to you, you may contact counsel for the plaintiff class:

Bruce A. Fredrickson
Webster & Fredrickson
1819 H Street, N.W., Suite 300
Washington, D.C. 20006
(202/659-8515)

October 4, 1988
Date

/s/ Judge Charles R. Richey
United States District Court
Judge Charles R. Richey

Awards

a monthly feature by
DOROTHY JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for March is:

Alma L. Aylesworth, WA5INV USA-CA All Counties #565, All SSB, 3-8-88

"I first became interested in ham radio back in 1958 and 59 when my husband was working to get his license. But my interest was not strong enough to cause me to work for the CW proficiency needed to get a license.

"After Scott, K5UTH, got his license and had built his first radio, I would listen and from time to time would talk with different people. I began actually to recognize some of their voices. With about five years of this, and with my husband's urging, I decided to try for my ticket. Also, Scott said he would like some better equipment and felt it would be easier to obtain if I were interested also.

"I received my Novice license, with a great deal of help from my husband, on November 4, 1963. I immediately made my first contact on CW with a college station in North Dakota. I was so nervous I could hardly send the code. I didn't really like CW so I immediately went to work to earn my phone license, which I received in March of 1964. I was off and running.

"I first went for the Rag Chewers Certificate, then the coveted Worked All States award. It was nip and tuck, as I needed one more state to complete WAS when we received orders to go to Germany. You see, we were stationed in El Paso, Texas at the Missile School. Well, at any rate, I needed to work Vermont, so a dear friend made a special trip and struggled to complete the contact. WAS was accomplished.

"We were off to Germany with a Swan 400, a vertical antenna, and other assorted gear. We even had a clothesline that we were able to load and use for an antenna. While we were in Germany, we heard about the Sideband System that operates on 14.332 MHz. We became members of the YLISSB in 1965, and that's when I really learned how valuable ham radio can be as a way of filling time. I made many contacts with my German call, DL5KV.

"We returned to the United States and retired on January 1, 1968. We also dropped out of ham radio operating for a period of about two years. However, we

333 South Lincoln Ave., Mundelein, IL 60060

Alma Aylesworth, WA5INV, ready for NC duty at her QTH in Mississippi.

then found the CHC net on 14.340 MHz with K6BX. I became MNC #138 in 1971, did a lot of control work on the CHC net, and hunted counties. But interest subsided again and we were largely inactive until 1985. At that time I became active both in net control work and in working counties as the mobiles put them out. I completed working all 3076 counties and on March 8, 1988 became the holder of USA-CA All Counties #565.

"I would like to thank all the mobile operators who ran the counties and the others for all their help. I'm now working on a second time around, along with others, to add to the many certificates and awards I have obtained over the years—too many to mention.

"I am still very active on the YLISSB System and hold a control spot on the SSB net every Thursday. I've been to several county hunters conventions and YLISSB conventions, and have met a lot of very wonderful hams. So, until another convention somewhere, thanks, ladies and gentlemen.—Alma, WA5INV."

Awards Issued

Richard Larsen, K8MW, submitted his paperwork on 11-23-88 and qualified for the All CW endorsement to his USA-CA All Counties #449, dated 12-3-83. Nice going, Dick.

Norman F. Wasson, W6NNV, submitted his filled record book and received USA-CA All Counties #589, All CW; and USA-CA 3000 #622, USA-CA 2500 #698, USA-CA 2000, #765, USA-CA 1500 #853, USA-CA 1000 #1040, and USA-CA 500 #2287, All CW Mobiles, all dated 11-1-88.

Ben Holm, KA0HJR, also made a clean sweep of it by claiming USA All Counties #590, USA-CA 3000 #623, USA-CA 2500 #699, USA-CA 2000 #766, USA-CA 1500 #854, USA-CA 1000 #1041, and USA-CA 500 #2289, Mixed, dated 11-5-88.

Michael Mardit, WA2VQW, accomplished that final step and received USA-CA All Counties #591, Mixed, dated 11-7-88.

Raymond A. N. Gomes, K9KKX, completed his quest and claimed USA-CA All Counties #592, All SSB, dated 11-9-88.

Scott M. Aylesworth, K5UTH, submitted his complete record of county contacts and received USA-CA All Counties #593, USA-CA 3000 #624, USA-CA 2500 #700, USA-CA 2000 #768, USA-CA 1500 #857, USA-CA 1000 #1043, and USA-CA 500 #2290, All Mobiles, dated 11-22-88.

Robert D. Hamell, K9MGF, also did it all in one step by claiming USA-CA All Counties #594, USA-CA 3000 #625, USA-CA 2500 #701, USA-CA 2000 #769, USA-CA 1500 #858, USA-CA 1000 #1044, and USA-CA 500 #2292, All SSB, dated 11-22-88.

Barry C. Dutcher, KA1CLV, added another gold seal to his certificate, receiving USA-CA 2000 #767, All CW, dated 11-16-88.

Katherine E. Sewell, KA4UEM, updated her good record by adding USA-CA 1500 #855, Mixed, dated 11-16-88.

USA-CA Honor Roll

3000		2500		2000		1500	
W6NNV	622	W6NNV	698	W6NNV	765	W6NNV	853
KA0HJR	623	KA0HJR	699	KA0HJR	766	KA0HJR	854
K5UTH	624	K5UTH	700	KA1CLV	767	KA4UEM	855
K9MGF	625	K9MGF	701	K5UTH	768	N2GOI	856
				K9MGF	769	K5UTH	857
						K9MGF	858

1000		500	
W6NNV	1040	W6NNV	2287
KA0HJR	1041	N4HIM	2288
KJ4LG	1042	KA0HJR	2289
K5UTH	1043	K5UTH	2290
K9MGF	1044	DL2XR	2291
		K9MGF	2292
		KW0U	2293
		G3GRX	2294

The total number of counties for credit for the United States of America County Award is 3076. The basic award fee for subscribers to CQ is $4.00. For non-subscribers, it is $10.00. Initial application must be submitted in the USA-CA record book which may be obtained from CQ Publishing Company, 76 North Broadway, Hicksville, NY 11801, U.S.A. for $1.25. To qualify for the special subscriber rate please send a recent CQ mailing label with your application. To be eligible for the USA-CA, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated April 2, 1985. A complete copy of the rules may be obtained by sending a SASE to the USA-CA Custodian, 333 South Lincoln Avenue, Mundelein, IL 60060, U.S.A. DX stations must include extra postage for air mail reply.

Say You Saw It In CQ

USA-CA Special Honor Roll

Norman F. Wasson, W6NNV
All Counties #589, All CW, 11-1-88

Ben Holm, KA0HJR
All Counties #590, Mixed, 11-5-88

Michael Mardit, WA2VQW
All Counties #591, Mixed, 11-7-88

Raymond A.N. Gomes, K9KKX
All Counties #592, All SSB, 11-9-88

Scott M. Aylesworth, K5UTH
All Counties #593, All Mobile, 11-22-88

Robert D. Hamell, K9MGF
All Counties #594, All SSB, 11-22-88

William B. Kelly, N2GOI, garnered another gold seal for his certificate by claiming USA-CA 1500 #856, All 20M SSB, dated 11-19-88.

Henry Petersen, KJ4LG, received USA-CA 1000 #1042, Mixed, dated 11-19-88.

USA-CA 500 certificates went to:

Norman F. Wasson, W6NNV, USA-CA 500 #2287, All CW Mobiles, 11-1-88.

Joseph M. Yarborough, Jr., N4HIM, USA-CA 500 #2288, All CW, 11-3-88.

Ben Holm, KA0HJR, USA-CA 500 #2289, Mixed, 11-5-88.

Scott M. "Scotty" Aylesworth, K5UTH, USA-CA 500 #2290, All Mobiles, 11-22-88.

Wilhelm Willisch, DL2XR, USA-CA 500 #2291, All CW, 11-22-88.

Robert D. Hamell, K9MGF, USA-CA 500 #2292, All SSB, 11-22-88.

Richard Harry Weil, KW0U, USA-CA 500 #2293, All 20M SSB, 11-25-88.

Eric L. Simpson, G3GRX, USA-CA 500 #2294, All SSB, 11-28-88.

Awards Available

West Siberia DX Club Awards. The West Siberia DX Club, formed by the radio amateurs of Omsk city, USSR, sponsors the following awards: WAWS (Worked All West Siberia), AOA (Arctic Ocean Award), U-PX-A (USSR Prefixes Award), U-1000000-C (USSR '1000000' Cities), PX-9-A (Prefix 9 Award), and WSA (West Siberia Award).

Contacts made on CW, SSB, or Mixed, starting January 1, 1980, count for the awards. QSOs with any stations—portable, special, memorial, etc.—are valid as long as they satisfy the award(s) requirements. Awards are issued separately for each mode. QSL cards need not be received by the applicants, except for SWLs. Applications must be verified by two amateurs with callsigns. If the applicant applies for a higher class award, he may also obtain lower class awards by requesting so on the application. The fee is 13 IRCs per award for all international applicants. Mail your log to Serge Kruglov, UA9MC, P.O. Box 836, Omsk-99, 644099, USSR.

WAWS requires QSOs (SWL reports) with the Western Siberia Oblasts identified by the following prefixes/Oblast numbers: UA9H/158, J/162, K/163, L/161, M/146, O/145, U/130, Y/099, Z/100. Class I: 40 QSOs with 9 different oblasts. Class II: 30 QSOs with 8 different oblasts. Class III: 20 QSOs with 7 different oblasts. Contact with UA9M/146 is required for any class of the award.

AOA requires QSOs (SWL reports) with amateurs of the following territories: JW Spitzbergen, JW Bear Island, JX Jan Mayen, KL7 Alaska, LA Norway, OX Greenland, UA1 FJL, UA1N Obl. 088, UA1O Obl. 113, UA1P Obl. 114, UA1 Novaya Zemlya, UA1Z Obl. 143, UA9K Obl. 163, UA0B Obl. 105, UA0K Obl. 139, UA0Q Obl. 098, UA0 Severnaya Zemlya, UA0 Wrangel Island, UA0 Novosibirskiye Islands, and VE Canada. Three contacts with the Soviet Polar drifting stations (UPOL, 4K0, etc.) may be substituted for any missing contacts with the above territories.

Class I: 20 QSOs with different countries and territories, Class II: 15 QSOs with different countries and territories, Class III: 10 QSOs with different countries and territories.

U-PX-A is awarded for working (hearing) different prefixes of the USSR. Class I: 200 prefixes; Class II: 150 prefixes; Class III: 100 prefixes; Class IV: 50 prefixes.

U-1000000-C is awarded for QSOs (SWL reports) with the following Soviet cities, which have populations in excess of one million people: Alma-Ata, Minsk, Kharkov, Baku, Moscow, Chelyabinsk, Gorky, Novosibirsk, Dnepropetrovsk, Odessa, Donetsk, Omsk, Yerevan, Perm, Kazan, Sverdlovsk, Kiev, Tashkent, Kuibyshev, Tbilisi, Leningrad, and Ufa. Class I: 22 cities; Class II: 20 cities; Class III: 17 cities. A QSO with Omsk is required for any class award.

PX-9-A is awarded for QSOs (SWL reports) with the stations all over the world that have the number '9' in the prefix—i.e., Y59, A92, 9Q5, UA9, etc. Class I: 50 prefixes from 20 countries (DXCC list) on 6 continents; Class II: 40 prefixes from 15 countries (DXCC list) on 4 continents; Class III: 30 prefixes from 10 countries (DXCC list) on 3 continents.

WSA is awarded for QSOs (SWL reports) with stations from Zone 17 (WAZ). One must 'assemble' the phrase "West Siberia Award" from the last letters of the callsigns of stations worked/heard. For example: ua9w**W** ul7c**E** um8m**S** . . . uh8a**W** ua9m**A** ua9m**R** ua9m**D**.

Worked South America (WSA) Award. The WSA Award is offered by Tom Hoke, K5ODZ. It is available to licensed ama-

ILA Awards display. Back row: Jamboree and Lifeboat Awards. Middle: QRP 250, Premier Prefix, and Gold Prefix Awards. Front: Broadcast and Medium Wave Awards.

Worked South America Award offered by Tom Hoke, K5ODZ.

teurs and SWLs worldwide for contacting/hearing the 13 countries in South America (Argentina, Bolivia, Brazil, Guyana, Chile, Colombia, Ecuador, French Guiana, Paraguay, Peru, Surinam, Uruguay, and Venezuela).

Send copy of the station log, signed at the bottom by the person seeking the award, along with a fee of $2.00 USA to Tom Hoke, K5ODZ, 4805 Willowbend Blvd., Houston, TX 77035.

Worked Central America (WCA) Award. The WCA Award is also offered by Tom Hoke, K5ODZ, for contacting the seven countries in Central America (Belize [formerly

Worked Central America Award available from Tom Hoke, K5ODZ.

British Honduras], Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama).

Send copy of the station log, signed at the bottom by the person seeking the award, along with the fee of $2.00 (USA) to K5ODZ at the same address as above.

International Listeners Awards. The International Listeners' Association, founded by Trevor W. Morgan, GW4OXB, offers a series of awards for listeners—not limited to "shortwave." They are the Jamboree Award, Lifeboat Award, Prefix Awards, Broadcast Listeners Award, QRP Award, and Medium Wave DXers Award. Send applications to ILA, 1 Jersey Street, Hafod, Swansea, West Glamorgan SA1 2HF, Wales, U.K.

Jamboree Award. This award is presented on behalf of the "White Fang Fellowship" during Jamboree on the Air. The aim is to log as many Scout stations as possible during that event. Scoring is as follows: stations in own country 1 point; stations outside own country 2 points; stations GB2WFF, GB2COD, and GB2GP each score 10 points.

Requirements: date, time, frequency, name of Scout troop operating the station. Entry fee is $1.00 or 4 IRCs (this is donated to charity each year).

Lifeboat Award. This trophy is for logging stations in 100 towns in the U.K. that have an active lifeboat service. If the lifeboat is situated in a remote area, the nearest main town will count. Requirements: date, time, frequency, mode, town. Entry fee $1.00 or 4 IRCs (this is donated to the RNLI).

Lifeboat Award Checklist: Aberdeen, Aberdovey, Aberystwyth, Abersoch, Aith, Aldeburgh, Alderney, Amble, Angle, Anstruther, Arbroath, Arran, Arklow, Appledore, Arranmore, Barra Island, Barrow, Barry Dock, Ballycotton, Barmouth, Bangor, Baltimore, Beaumaris, Buckie, Borth, Bude, Burnham on Crouch, Burry Port, Bembridge, Blythe, Brighton, Berwick on Tweed, Bridlington, Broughton Ferry, Blackpool, Calshot, Caister, Cambeltown, Cardigan, Clacton on Sea, Cromer, Clovelly, Criccieth, Conwy, Cullercoats, Clougher Head, Crimdon Dene, Court McSherry, Dover, Dungeness, Douglas, Dunbar, Donaghdee, Dun Laoghaire, Dunmore East, Eastbourne, Exmouth, Eyemouth, Filey, Fowey, Falmouth, Fishguard, Flint, Fleetwood, Frazerburgh, Great Yarmouth, Gorleston, Girvan, Galway Bay, Hartlepool, Humber, Hunstanton, Happesburgh, Harwich, Horton and Port Eynon, Hastings, Holyhead, Hayling Island, Holylake, Helensburgh, Howth, Ilfracombe, Islay, Invergordon, Kippford, Kirkudbright, Kilmore, Kirkwall, Kinghorn, Lowestoft, Littlestone on Sea, Littlehampton, Lymington, Lyme Regis, Lizard, Landudno, Lytham St. Annes, Lochinver, Longhope, Little and Broad Haven, Lerwick, Mablethorpe, Margate, Mudeford, Minehead, Mumbles, Moelfre, Morecambe, Montrose, Mallaig, Newhaven, Newquay, North Sunderland, North Berwick, Newcastle, New Biggin, New Brighton, Oban, Portsmouth, Pole, Plymouth, Penlee, Padstow, Port Isaac, Penarth, Porthcawl, Portrush, Pwllheli, Port St. Mary, Porth Dinllaen, Port Erin, Peterhead, Portaferry, Port Patrick, Queensferry, Rye Harbour, Redcar, Ramsgare, Rhyl, Ramsay, Red Bay, Rosslare, Skegness, Staithes and Rudwick, Scarborough, Sheringham, Southwold, Southend on Sea, Sheerness, Shoreham, Selsey, Swanage, St. Helier, St. Catherines, St. Peter Port, Salcombe, Sennen Cove, St. Mary's (Scilly), St. Ives, St. Agnes, St. Donats, St. Davids, St. Bees, Silloth, Stranraer, Stornoway, St. Abbs, Skerries, Stromness, Torbay, Teesmouth, Tynemouth, Tenby, Troon, Treadour Bay, Tignabruaich, Thurso, Tramore, Valentia, Whitby, Withensea, Wells, Walton and Frinton, West Mersea, Whitstable, Walmer, Wick, Weston Super Mare, West Kirby, Workington, Weymouth, Wicklow, Yougal, Yarmouth.

Prefix Awards. These awards are presented for logging amateur prefixes. Prefixes are as defined in "Geoff Watts Prefix Lists" (copies are available from ILA at $1.00 pp). There are four awards. Certificates are available for 250 and 500 prefixes and trophies for 1000 and 2000 prefixes. Totals are cumulative—i.e., the first 250 count for the 500, etc. Awards can be claimed for single mode or band or mixed and should be in alpha-numerical order. Requirements: station, date, time, frequency, mode. There are no entry fees for these awards, but please supply sufficient postage for return of your logs and awards.

Broadcast Listeners Award. This certificate is awarded for logging 100 standard broadcast stations outside your own country. Pirate/Clandestine stations DO NOT count. More than one station in any country can be logged—e.g., Radio Kiev, Vilnus, Moscow all count separate. Requirements: date, time, frequency, station name. There is no entry fee, but enclose a first-class stamp for return of the certificate and log.

QRP Award. This trophy is for logging 250 amateur stations operating at an output power of 3 watts or less. Requirements: date, time, frequency, mode, power used by station logged, G-QRP number where possible. There is no entry fee, but enclose a first-class stamp for return of trophy and log.

Medium Wave DXers Award. This certificate is presented for logging 100 broadcast stations outside your own country on the medium-wave bands only. Requirements: date, time, frequency, station name. There is no entry fee, but enclose a first-class stamp for return of certificate and log.

Good Hunting. See you in April!

73, Dorothy, WB9RCY

rfconcepts

NEW! NEW! NEW!

Model RFC8-RC repeater controller is a control system that handles all the requirements of large multiple interconnected systems as well as a simple repeater. All command codes are remotely programmable as are the various timers, tone pitches and ID messages. All data is stored in non-volatile Eprom so battery backup is not required to maintain operating parameters in case of power failure. The RFC8-RC is very affordable, suggested list is **$395.00** for the basic board. **Options include**: auto patch, remote base interface, link interface, packet interface, etc.

144 MHz Amps
RFC 2-23, 2W in = 30 out
RFC 2-217, 2W in = 170 out
RFC 2-117, 10W in = 170 out
RFC 2-317, 30W in = 170 out
RFC 2-417, 45W in = 170 out

220 MHz Amps
RFC 3-22, 2W in = 20 out
RFC 3-211, 2W in = 110 out
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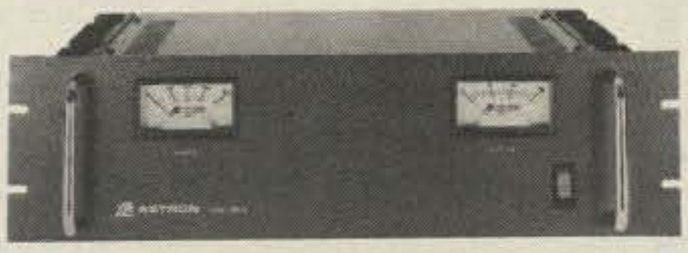

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RS-12A	9	12	4½ x 8 x 9	13
RS-20A	16	20	5 x 9 x 10½	18
RS-35A	25	35	5 x 11 x 11	27
RS-50A	37	50	6 x 13¾ x 11	46

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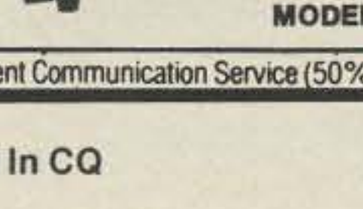

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Mar. 12, **Delaware Valley Radio Assn. HAMCOMP '89,** New Jersey National Guard 112th Field Artillary Armory, Lawrence Township, New Jersey. Contact HAMCOMP '89, c/o KB2ZY, RD1 Box 259, Stockton, NJ 08559 (SASE).

Mar. 12, **Sterling-Rock Falls Hamfest,** Sterling High School Field House, Sterling, Illinois. Contact Sue Peters, P.O. Box 521, Sterling, IL 61081 or call 815-625-9262.

Mar. 12, **Morgan County Repeater Assn. Indiana Hamfest,** Indiana State Fairgrounds Pavilion Bldg., Indianapolis, Indiana. Contact Aileen Scales, KC9YA, 3142 Market Place, Bloomington, IN 47403 (812-339-4446).

Mar. 18, **Red River Hamfest and Computer Fair,** New Day's Inn, Moorhead, Minnesota. Contact Tim Gooding, KDØYX, 1006 Sheyenne St., West Fargo, ND 58078. (VE Testing available.)

Mar. 18–19, **North Florida Ham/Swapfest,** Shrine Fairgrounds, north Ft. Walton Beach, Florida. Contact Playground ARC, P.O. Box 873, Ft. Walton Beach, FL 32548.

Mar. 19, **Toledo Mobile Radio Assn. Hamfest,** Lucas County Recreation Center, Maumee, Ohio. Contact Ron Morris, WB8ZIM, 28141 Glenwood Road, Perrysburg, OH 43551 (419-666-8063).

Mar. 19, **South Eastern Michigan ARA Hamfest/Swap & Shop,** Grosse Pointe North High School, Groose Pointe Woods, Michigan. Contact SEMARA Swap, P.O. Box 646, St. Clair Shores, MI 48080 (SASE) or call Thomas Orlicki, N8HLY, 313-526-9498 evenings after 6 PM.

Mar. 19, **LAMARSFEST '89,** Lake County Fairgrounds, Grayslake, Illinois. Contact LAMARS, P.O. Box 751, Libertyville, IL 60048, or call Bob Dick, NY9E, 312-362-9634 after 7 PM.

Mar. 25, **Kentucky State ARRL Convention,** Pritchard Community Center, Elizabethtown, Kentucky. Contact Chuck Strain, AA4ZD, P.O. Box 342, Vine Grove, KY 40175 (502-351-1715). (VE Testing available.)

Mar. 26, **Radio Communications Monitoring Society of Maryland Group Tour of ARINC Headquarters,** Annapolis, Maryland. Contact Izak Luchinsky, P.O. Box 5722, Baltimore, MD 21208 (SASE) (301-486-4948).

Mar. 31 through Apr. 2, **1989 Midwest ARRL Convention,** Kansas City Convention Center, Kansas City, Missouri. Contact PHD ARA, P.O. Box 11, Liberty, MO 64068 (SASE), or call 816-781-7313.

Apr. 1, **Split Rock ARA North Jersey Hamfest,** Dover Armory, Dover, New Jersey. Contact Harvey Klein, WA2JHT, 201-538-1768.

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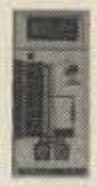

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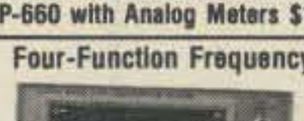

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CIRCLE 19 ON READER SERVICE CARD

Our Readers Say

Battery Pack Correction

Editor, *CQ:*

I just received the January issue of *CQ* and I am writing in regard to my article on page 64. There is a typographical error in the first column. The Radio Shack cells are listed as part number 23-190, when they are part number 23-191.

Paul M. Petty, KA8RMB
Union, OH

From Vatican City

Editor, *CQ:*

We receive your interesting *CQ* magazine monthly and thank you for your attention. We would like to take this opportunity to congratulate you on the organization of the *CQ* WW WPX Contest. Our radio amateur station, HV3SJ, Vatican City, took part in the last CW contest (May 28–29) with two Americans as guest operators (K4TKM and K4TEA). The score was quite good in spite of the problems we had during the contest with our old linear amplifier in the shack. We hope for a better score in the next *CQ* WW CW WPX Contest.

Special thanks and special 73's.

Curia Generalizia Gesuiti, HV3SJ
Rome, Italy

New Life As A Ham

Editor, *CQ:*

You gave me new life as a ham! I was about to give up on making a QSO as a Novice until I read Peter O'Dell, KB1N's article "How To Successfully Fail At Being A Novice" in the November 1986 issue of *CQ* which I found at a radio repair shop. I had tried for several days after I got my Novice license to make a contact but had failed each time. Your article was just what I needed to convince me that I wasn't just plain dumb when it comes to code.

When I would hear my call come back to me I would go completely blank, and no matter how hard I tried I could not get my mind to even take the slowest code, even if I was doing great on 10 wpm on practice tapes. I was really ready to call it quits.

Your article gave me the kick I needed to try again, and that very night I made two successful QSOs using the outlines you described in the article. With the confidence of making successful contacts I now am improving to the point that I am going to try to pass the General exam. Your article is just what beginning Novices need to read, and I would like to see it repeated so more of the newer hams could see that it pays not to give up.

Chuck Morgan, KB5HBD
Monroe, LA

More On 10 Meters

Editor, *CQ:*

I want to say that *CQ* is a great monthly magazine, and keep up the fine work. I would like to see some articles on testing some 10 meter equipment. Examples would be Radio Shack's HTX-100 mobile, Ranger AR355 mobile, President HR-2510 mobile, and 10 meter DX Handy handheld. Thank you for your attention to 10 meter equipment.

Roger L. Gutka, WD8QYF
Mt. Pleasant, MI

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CIRCLE 119 ON READER SERVICE CARD

DX

a monthly feature by
HUGH CASSIDY, WA6AUD

NEWS OF COMMUNICATION AROUND THE WORLD

Of all the languages on earth
In which the human kind confer,
The Master Speakers are DXers,
They are the Great Interpreters . . . .

Years back we were firmly advised that to be a good DXer you have to be a good listener. "In DXing listening brings knowledge," we were told. "Listening brings countries, and listening brings friendships. Always be a good listener." We listened and believed, and everything came as promised. But there have been times when we wondered if that long-ago given dictum, delivered in a most firm tone, ever anticipated some of the problems that being a good listener might bring in these latter days of DXing—things such as the importance of a DXer's socks. Certainly there are things with which we must now cope that were not even promised nor implied back in those learning days.

March is a good month here in the eastern Pacific. Spring comes in late February. The days are warm, winter is gone, and the hills are green. Always there are DXers out in the sunshine enjoying the good days of Cycle 22 and speculating on whether the cycle will peak this year or next. And they never tire of talking about DX. Just rub two of them together and there will be instant joy.

Last week a quorum of DX types was doing just that, the Old Timer down from the top of the hill and a Local up out of the village in the valley. One of the expected joys of spring is sitting under the big oak tree talking DX and looking down the bay to forever. A north wind during the night had left sparkling visibility, and office towers 20 miles down and across the bay were visible in every detail.

It was a good time of year, and we talked of the ancient history of DXing, that being anything that happened ten or more years back. We also talked of the present status of DXing, of beams and rigs and countries and DXers. We talked of new bands, club affairs, and the increasing complexity of DXing gear. We talked of packet radio and the notable lack of voice DX alerts on the 2 meter box and the need to watch the monitor. We even talked of DX contest operating, where data processing often is the key to triumphs, and the hard disciplines that the top contesters impose on themselves in their effort to rule the contest bands. DXers always have a lot of things to talk about.

Then the Local said something and we listened. We listened because there have been times when we've thought that some of the newer DX types can often be found working the other side of the DX bands. And they do think of matters and techniques and developments which we more mature DXers may have overlooked. "How do you hang your socks to dry?" the Local asked, and there was a silence. Certainly the silence was to give us a chance to weigh the nuances in the question.

77 Coleman Drive, San Rafael, CA 94901

What happens when a couple of amateurs who are also MDs meet at a convention? They end up at a local amateur station. On the left is George Grecos, SV1NA, of Athens, who welcomed Valery Stefannov, LZ2CJ, in Athens for a medical conference. You see them discussing DX at SV1NA's station. There are a couple of awards on the walls that any DXer will readily recognize.

Was this a DX matter or a household chore, we had to ask ourselves. Possibly it was even both. But finding that conservatism comes with the years, we held back and waited for the Old Timer to speak. He is one who always wants to know more of everything, and he soon asked, "Why?" That was enough to open the door to the new wisdom. Maybe . . . .

"I am sure that both of you at times have observed something," the Local started in, "observed something which drew your attention, but which you may not have comprehended at the time." Both we and the Old Timer were nodding to this statement. It takes a lot of years to learn that there is a reason for everything that happens and nothing happens without a reason. But the Local was continuing in his explanation.

"Years back at one of the International DX Conventions," he said, "I noted that one of the big-gun southern California DXers had socks with his callsign on them. When the cuff of his pants came up above his ankles, you could read his callsign. And these were hand-knitted socks, definitely nothing you would find in any supermarket. I admired them and was told that they were knitted by his mother-in-law. Think of that! This DXer had to be one of the anointed. But once as he dangled one leg over the other a shoe slipped off, and I noted that 'N' was knitted into the toe of the sock. It took me years to figure out all of this. Maybe I shouldn't even mention it because you two old timers probably know all about this already, right?"

Wrong! This one had lost us completely. If there was something we should have understood, it must have gotten by while we were checking another sector. So we just tried to look understanding, pursing our lips in concentration and nodding our heads, radiating the understanding that we did not have. "Go on," we suggested, and away the Local went.

"You know something," the Local said, "I first noted those socks back in the '70s, but it took almost ten years for me to figure out things. It was not until I attended a discussion on Holistic DXing that the things that I had observed but had not understood started to fall into place. See what I mean?" Actually, we did not, and apparently neither did the Old Timer. And neither of us was even remotely willing to say anything at that point.

It did not matter much. The Local had the chair and he was running the show. "When I learned that the wholes, or some of the wholes, can have characteristics that cannot be explained in relation to their constituent parts, I started to see a light. I saw it but did not yet understand. Understanding came when I read a research paper on magnetic resonance. When I understood how a magnetized system can have its energy absorbed when in resonance with an electromagnetic wave of radio frequency, I started to understand. Get it?"

At this point we were getting very little, but wished heartily that this Local would stop checking with us about every other breath for our understanding. That was something we were still working on. "But the socks?" we demanded, perhaps a bit brusquely. "How does all of this have anything to do with hanging your socks out to dry? Is there any connection at all?" There was, and the Local held up his hand to stay our impatience. "I'm coming to that part," he said. "I was just thinking that maybe you knew all this already." We had to advise that we did not.

We held back on our impatience, and the Local plunged on. "When I started to understand the parts of the matter, I understood the whole, the sums being the callsign socks, he being a DXer, and the 'N' on the toes. Add in the plentitude of mhos west of the Rockies, the radiomagnetic environment to which DXers are often exposed, and then the whole becomes greater than the parts. This fellow is a holistic DXer, and he has brought all the factors together.

"I realized that those hand-knitted socks undoubtedly are hand-washed to avoid shrinkage. You would not dare expose them to the heat of a dryer, so you hang them on a line. To ensure that the magnetic lines in the dried socks are parallel to and in polarity with the local magnetic field, the socks must be hung on the line with the 'N' pointed north, and with the proper magnetic variation for the area. Hereabouts it is about 19° east, but it varies according to area. Thus, when this DXer sits at his rig, the part of him closest to the local magnetic field is his feet. THe volume of mhos is another factor, and again the feet are closest to the earth where the mhos are.

"It took me a long time to understand the fallacy of so many DXers being concerned about high towers and big beams but failing to provide for the vital alignment of the operator with the magnetic lines of force. Now that I have explained it, don't you understand why his call is on his socks and the 'N' on the toes? This fellow is a big-gun DXer in southern California. I also found out that years ago he was sent to Spain to teach electronics. Haven't you noted, possibly even wondered about, the recent upsurge in the DX activities by the Spanish DX-

Say You Saw It In CQ

The WPX Program

Mixed

1371	VE2OMM	1374	YU2GIJ
1372	NW9G		

SSB

2023	IK7HPG	2027	KA5RNH
2024	EA2BUF	2028	YB7BC
2025	N4QGH	2029	K8YVI
2026	JJ1SBO		

CW

2552	OK3TAD	2554	YC3HCM
2553	VE2OMM		

Endorsements

Mixed: 450 DF5TS, YU2GIJ. 500 YU2GIJ. 550 YU1GIJ. 600 YU2GIJ. 650 YU2GIJ, W3KWH. 700 YU2GIJ, W2KWH, IK2BHX. 750 YU2GIJ. 800 NK7W, YU2GIJ. 850 YU2GIJ. 900 YU2GIJ. 950 YU2GIJ. 1200 N2AIF. 1250 K5RPC, N2AIF, IT9TQH. 1300 K5RPC, N2AIF, IT9TQH, K4RDU. 1350 N2AIF, IT9TQH. 1400 W4UW, N2AIF, IT9TQH. 1450 IT9TQH. 1500 IT9TQH. 1550 IT9TQH, I1EEW. 1850 SM3EVR.

S.S.B.: 350 I7VEZ, IK@APR, EA2BUF, KA5RNH, K8YVI. 400 I7VEZ, IK@APR, EA2BUF, KA5RNH. 450 I7VEZ, IK@APR, EA2BUF, KA5RNH. 500 IK@APR, I7IYW, KA5RNH. 550 IK@APR, I8IYW, KA5RNH, K9EC. 600 IK@APR, IK7DBB, I8IYW, KA5RNH, K9EC. 650 I8IYW, KA5RNH. 750 N2AIF. 800 N2AIF, IK3MJR. 850 CT1CDL, N2AIF. 900 CT1CDL, N2AIF. 950 CT1CDL. 1000 IT9TQH. 1050 KE6KT, IS@QDV, IT9TQH, KD9OT. 1100 IS@QDV, IT9TQH. 1150 IS@QDV, IT9TQH. 1200 IS@QDV, IT9TQH. 1250 IS@QDV, IT9TQH. 1300 IT9TQH. 1400 W4UW, I1EEW, 2750 ZL3NS.

CW: 350 OK3TAY, VE3OMM, YC3HCM. 400 YC3HCM. 450 YC3HCM. 500 YC3HCM. 550 YC3HCM. 600 KS3F, YC3HCM. 650 YC3HCM. 700 YC3HCM. 750 OZ4RS, PA3BEJ, YC3HCM. 800 PA3BEJ, IS@QDV, YC3HCM. 850 IS@QDV, IT9TQH. 900 NF5Z, G3VQO, IS@QDV, IT9TQH. 950 IS@QDV, N2AIF, IT9TQH. 1000 N2AIF, IT9TQH. 1050 VE1ACK, N2AIF, IT9TQH. 1100 VE1ACK, N2AIF, IT9TQH. 1150 W9PWM, N2AIF. 1200 W9PWM. 1450 IT9VDQ. 2000 N2AC. 2200 W3ARK. 2250 W3ARK.

10 Meters:	OK2PO, YU2GIJ
15 Meters:	YU2GIJ, WN5MBS
20 Meters:	YU2GIJ, K9EC
40 Meters:	YU2GIJ
80 Meters:	KA@ZFX, YU2GIJ
160 Meters:	OK2PO, KS3F

Asia:	YU2GIJ, YC3HCM
No. America:	I2IAU, N3QGH, YU2GIJ, VE3OMM, YC3HCM
So. America:	KD9OT
Europe:	I2IAU, EA2BUF, YU2GIJ, YC3HCM
Oceania:	DJ2UU, I8IYW, K2POF, YC3HCM, WN5MBS

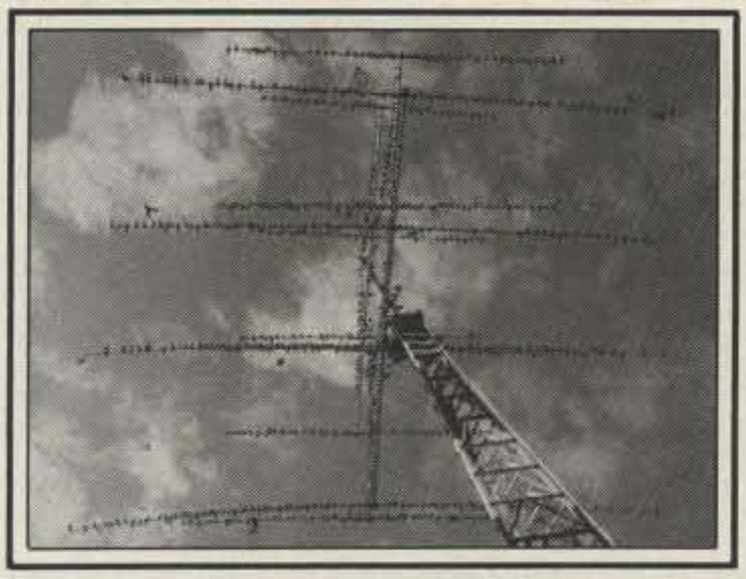
Award of Excellence: K2SHZ, UP1BZZ.

160 Meter Endorsement: UP1BZZ.

Award of Excellence Plaque Holders: W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM@DJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, K6JG, N4MM, I8YRK, W4CRW, SM@AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DE@DXM, DK4SY, UR2**, AB90, FM5WD, I2DMK, W4BQY, I@JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, K@JN, W4VQ, KF2O, K3UA, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ.

Award of Excellence Plaque Holders with 160 Meter Endorsement: OK1MP, N5TV, W8CNL, W1JR, W6OUL, W4BQY, W5UR, N4NO, W8RSW, N4KE, I2UIY, W8ILC, W1BWS, NN4Q, G4GUE, LU3YL/W4, I4EAT, VE7WJ, W9NUF, N4NX, VK9NS, DE@DXM, VE7IG, K9BG, AB9O, FM5WD, SM@DJZ, DK5AD, SM6CST, I1JQJ, W3ARK, HI8LC, KA5W, UR2**, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM@AJU, KF2O, SM3EVR, K5UR, UP1BZZ.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ WPX Awards, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.



How do you attract birds to your garden? All Dick Dorrance of Goiania in Brazil did was put up a tower and look at what happened. Eighty-five feet up there are four-element monobanders for 10/15/20 meters. They are there under the birds. Dick, who was once W2LEJ, retired to Brazil and ended a long run with CBS. In Brazil he is a regional official for LABRE, the Brazilian national amateur society.

ers? Have you ever stopped to wonder why? And now maybe you can understand why I asked about how you hang your socks to dry." The Local leaned closer to hold us with a hot eye and a voice possibly tinged with scorn. "Certainly you *do* understand all of this, don't you?"

What could we say? Actually, all we could do was nod our heads. Somewhere along the line we had lost all coherency. We were hearing but not quite understanding. What bothered us, and continues to bother us, is that there was a bit of logic somewhere in all his words, but we cannot as yet figure out if it all adds up. You know, something like the whole maybe being more than the sums. Or did we get even that right?

Some days later the Old Timer came wandering down the hill again and we just had to ask, "Did you understand that Local the other day? All that talk about the mhos and the socks and the magnetic fields? Did you? The Old Timer shook his head.

"Not really," he said. "I sort of think it was like that little fellow who came bouncing up the hill a couple of years back and told us that he was explaining all the Mysteries of the Ages, and then all he said was 'DX IS!' It all sounded right—at least the words did—but I have yet to understand the thought. Even now I cannot say that he was wrong. Just like the socks. But I cannot accept that he might be right either. How about you?"

It was a good question. How about you?

Malyj Vysotskij Island

This new country has been unanimously accepted by the ARRL Awards Committee, they accepting the majority recommendation of the DX Advisory Committee. The Awards Committee also voted to accept the DXAC determination that the operation of 4J1FS last summer met the country accreditation criteria.

The island is USSR territory leased to Finland. It is separated from Finland by intervening Russian territory. The press release states that the island was found to meet the country criteria, saying, "... was found in 1970 to qualify as a separate DXCC country under Point 3(b) of the Countries List Criteria, and was awaiting activation." It might be noted that the country criteria as listed in *QST* February 1969 and October 1972 does not list a 3(b) sector, while the current criteria does have a 3(b). On the matter of "separate administration," this was in Point 1 of the country criteria in 1969 and 1972. The current 3(b) of the criteria reads:

> (b) **ISLANDS**: Where two islands, of the government under Point 1, are totally separated by an intervening DXCC country (also under Point 1), each island counts as a separate DXCC country. No minimum distance is required. The test for total separation means that a straight line cannot be drawn from any point on one island to any point on the other island without passing through another DXCC country. This intervening country may be part of either island, another island, or part of a continent.

It might be noted that the DXAC was not unanimous in its voting, though the Awards Committee was. One of the sticky points was the use of the Russian prefix. In 1970 there was initial approval given to county status of Malyj Vysotskij. In the intervening years the criteria was changed, and the current Point 4(c) might be mentioned in relation to this matter. This is Ineligible Areas and Point 4(c) reads:

> **Ineligible Areas**
> (c) The following do not count as a separate DXCC country from the host country: Embassies, consulates and extra-territorial legal entities of any nature, including, but not limited to, monuments, offices of the United Nations agencies or related organizations, other inter-governmental organizations or diplomatic missions.

In one comment by a member of the DXAC on this decision, it was said that in the course of discussion it was the sense of the Awards Committee, however, that Majyj Vysotskij may very well have qualified under the now defunct "separate administration" clause of the country criteria. This clause was in effect when the first tentative approval was given for the island as a DXCC Country, this back in 1970.

Possibly more will be heard on this one, there being a number of factors that may be the subject of further study. The island is leased but not owned by Finland. A Russian prefix was used. And apparently a deleted criteria had some significant bearing on the current decision. If you have a card for this operation in your hand, you can submit it for DXCC credit starting March 1, 1989. QSLS submitted before that date will be returned without credit.

For those who might be interested, and especially for those DXers wishing to understand the application of the country criteria, it might be well to keep these factors in mind.

1. Malyj Vysotskij is USSR territory and leased to Finland. It is separated from Finland by intervening Soviet territory, and a straight line cannot be drawn from Malyj Vysotskij to any Finnish Island without crossing Soviet territory.

2. A Russian callsign prefix was used in the operation.

3. The initial and preliminary approval of Malyj Vysotskij as a DXCC country was contained in a letter written in 1970 and apparently was on the basis of the "separate administration" then contained in the country criteria. Though this clause was eliminated some years back, apparently it was considered to still have some validity when the island was put on the air 18 years later. It is reported that under the

The WAZ Program

10 Meter Phone

323 N4CC

15 Meter Phone

262 OK1DLA 263 N2BAT

20 Meter Phone

706 YB6MF 709 HL1IE
707 K4PR 710 W7HHP
708 K8YVI 711 EA5AL

40 Meter Phone

48 JA1UQP

80 Meter Phone

48 JA1UQP

10 Meter CW

61 W8UVZ 62 K1JA

15 Meter CW

133 WA4CTA

20 Meter CW

314 WL7E 315 W6JTI

40 Meter CW

88 JA4VUQ

All Band WAZ

SSB

3253	IK2HSW	3262	W7HHP
3254	KD5DR	3263	WB5VFL
3255	EA5JC	3264	JA6CBG
3256	AL7EL	3265	WA6IVO
3257	AC2J	3266	WA9QII
3258	KF5MY	3267	EA7CWC
3259	KI6WF	3268	NK2H
3260	DL9XW	3269	DL3UB
3261	SV1ADG	3270	EA7DGO

Phone/CW

6419	IK2HSW	6432	YU2GIJ
6420	JH2TJN	6433	K7DZ
6421	N9DJ	6434	I3VQD
6422	N9DJ (CW)	6435	WR7C
6423	HB9DGZ	6436	PA3CBZ
6424	DJ3TO	6437	KF8N
6425	YB2BNJ	6438	JA1XS
6426	WA9MAG	6439	JE3TWJ
6427	G4MVA	6440	EA4JX
6428	I3JRF	6441	KE5RG
6429	KJ4VH	6442	G3DPX
6430	JH3CKP	6443	W0MHK
6431	KI6WF		

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (39 cents) size 4½ × 9½ to the W A Z Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

"separate administration" clause, the callsign would not have been an issue.

This is a very interesting case. If you have a card for the 4J1FS operation, remember that you can submit it as of March 1st. It might be best to submit it then and worry later about the interpretations. Once you get the credit for 4J1FS you will have a wider perspective in your study of how an island leased by one country can be considered sovereign territory of another country. You will find that it will be easier to attain fuller understanding.

Egypt

Charles Signer, WA9INK, whom some DXers with long memories will remember as the

This is Dr. Charan Singh, 9V1NR, in Singapore, along with his QSL Manager. The FT101 is still 9V1NR's operating gear. General coverage receivers are reported as not being allowed. Note that the doctor believes in "GO" cereal.

DX Editor of *World Radio* and a member of the 1978 Clipperton effort, has been in the Middle East for a number of years and currently is based in Cairo. He advises that he now has a license and the call SU1EE, the license good through 1989. Charles also reports that WA6OWU from Ventura, California has been issued the callsign SU1EK.

SU1EE will be in Egypt for another year or so and then will go to ST2-Sudan on his next assignment, hoping to put both ST2 and ST0 on the air while in the upper Nile region.

Charles reports that he works 80 through 10 meters, and listens for those distant areas like the Pacific and the western United States, these often having problems working the Middle East. He reports being the final zone needed for a WAZ for several of the needy DX types, and just before Christmas he was hearing the western reaches on LP around 1400Z.

QSLs for SU1EE go to the *Callbook* address for WA9INK; for SU1EK they go to WA6OWU. Should you be interested in a schedule, drop Charles a note: Charles Signer, American Embassy-Cairo, Box 10, FPO New York 09527. Charles has also been reported around 7015 kHz after 0300Z, and at 14040 kHz after 0500Z. John, SU1EK, has shown on 10 meters after 1530Z and above 28600 kHz.

New Country

Run that flag up the pole and you will get any true-blue DXer standing tall and saluting. "QRZ DX" notes the increased popularity of FO5LZ in the Marquesas Island Group since Rotuma out to the west was put on the air. There has been some mention that the DXAC, in studying the new Country Criteria, was aware that some new countries would pop up with the change in the criteria for distances between islands. Some optimistic DXers, those always in the know, naturally, say that "... if Rotuma comes, can Nuku Hiva be far behind?" A study of the available maps indicates that the closest distance between the Marquesas and any other island group in Polynesia is between Fatu Hiva in the Marquesas and Tepoto in the Disappointment Group, this being in the Tuamotu Archipelago. There has also been talk that some French DX types are giving the matter more than casual attention, but you might also listen for Jean Claude at FO5LZ.

If all this whets your interest and revives your hunger for a new one, keep in mind that in studying a map of the area there are often variations in the spelling of an island. Tepoto has a different spelling on some maps. Try pronouncing the names for a clue, remembering to pronounce every vowel. If you really get serious and wish to graduate from the National Geographic maps, which while good are too small a scale for a dedicated DXer, consideration should be given to nautical charts. These are available in large scale and are often the most accurate maps available, but do cost a few dollars more. In big cities information often is available at government book stores, these usually being part of a GSA facility. The National Oceanic and Atmospheric Administration in Washington produces the charts as well as various Sailing Directions and Coastal Pilots. For example, all you might want to know about Kure, except for when it is on the air, can be found in the U.S. Coast Pilot 7 book, this covering the west coast and the Hawaiian group. In coastal areas yacht chandleries are a good source for nautical charts.

A smart DXer is not necessarily one who knows all the answers. He is just one who knows where to find them when needed. Now that we have brought you this far, it might be noted that some say that the Marquesas may not quite make country status because the FO prefix covers French Polynesia and not just Tahiti. However, some astute types note that it does seem that Point 2(a) might apply if you consider that the Tuamotus and the Society Islands (Tahiti) are the "parent" country and the Marquesas are off-shore, separated by 225 miles. Just hope, hold on to your patience, and someone will figure out things so that the Deserving will get what they deserve. One thing for sure, the DXCC will never run out of new countries. As one forgotten politician often said when pressed on a point, "Let's look at the record!" And the record is that there will always be something for the Deserving. There always has.

Cycle 22

Most every DXer is interested in sunspots. The more there are, the better the bands.

---

5 Band WAZ

As of December 1, 1988, 198 stations have attained the 200 zone level.

New recipients of 5 Band WAZ with all 200 Zones worked:

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JA1SVP
DJ8NK

The top 8 contenders for 5 Band WAZ are:

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2. SP9PT, 199
3. K6YRA, 199
4. K9GX, 199
5. SP6JCY, 199
6. W2YY, 198
7. W7UR, 198
8. KB0U, 198

513 Stations have attained the 150 Zone level.

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FT411-811
FT-1903/1123
FTH-2005/7005

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IC-A2/U16

Landmobile HT's
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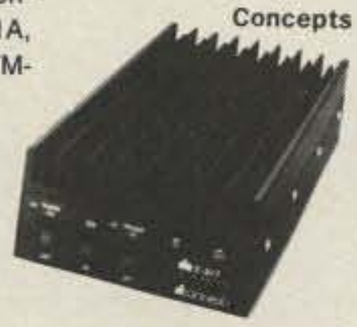

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VK-land is a big place and some of it being a tropical area is sometimes a surprise. Here is Wayne, VK4KPL, who lives in the near rain-forest country outside Cairns in Queensland on the northeast coast. Wayne is active on SSB, working the 20/15/10 MHz bands.

Though that might not be exactly correct, it does indicate the prevailing thinking among the Deserving. It does seem that Cycle 22 is bringing DXers something more than was anticipated with the solar activity running ahead of expectations.

The NOAA's Space Environment Laboratory at Boulder had predicted that the current cycle will be unusually active, and it does not seem that they have overestimated things at all. There was a big surge in solar activity last summer, some saying it being the biggest surge since Cycle 18 was ending back in 1956. There have been some writers speculating that the peak of Cycle 22 may come as early as the end of the year, and next year for sure.

Like a good many other things that today's DXer assumes were always with us, the sunspots, flux, and things like that were not really considered in connection with amateur radio until the early sixties. Ted Cohen, N4XX, whom many will remember for his Washington coverage, did much to point out the connection, this a result of his work in the study of the solar phenomena. In these latter days of DXing this information is taken for granted, many checking WWV when there is a need for real-time information on conditions. It wasn't always that easy.

The current cycle is estimated to be about a year ahead of schedule, an indication that this cycle will be an unusually active one. One of the effects of the high solar activity will be an increase in the ozone layer, something which everybody worries about these days. Dr. Koeckelenbergh at the Brussels Sunspot Index Data Center estimated that February would have a smoothed, 12-month running number of 143 and March will have a number of 149. The cycle is on the up-curve. Work all the high-frequency bands while you can and especially if you are searching for 5-band counters. And though the sun has been around for a number of years, those studying it continue to learn new things about it. And what they learn can often be interesting to DXers. We need all the help we can get!

Antennas

A tall tower and a big beam are always a comfort to the Deserving DXer, but often neither is possible nor practical. In sunny Bloomington, Minnesota Richard Weil, KW0U, works DX with some 14-gauge wire about 10 feet off the ground. It has its limitations, but KW0U does manage.

Definitely it is not the antenna for busting through a pile-up, and the 20 meter dipole fed by an FT-101B running barefoot does not catch the far ones. However, it still works a lot of counters.

KW0U figures that he can work, with some effort at times, most of the DX showing within an ellipse bounded by a line from Auckland to Easter Island, to Argentina, Italy, Western Europe, Ellsmere Island, and Hawaii. There is a lot of DX available within those boundaries, and granted, there is also a lot of DX outside.

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. Total countries are now 319. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsement involving the issuance of a sticker is $1.00.

CW

N4JF	319	W8KPL	314	K8PYD	310	DL6QW	300	WA4JTI	290	K1VHS	282
K2FL	319	DL3RK	314	AA6AA	309	W7CNL	299	KQ9W	290	N4AH	281
W9DWQ	319	K9AB	314	W9RY	308	K3FN	298	IT9QDS	290	K7ZR	280
K4CEB	319	DL8CM	314	EA2IA	308	DJ7CX	297	W1WLW	289	I5XIM	280
K2TQC	319	N6CW	313	W4OEL	307	K8LJG	297	W4BV	289	W2LZX	280
K9MM	318	K1MEM	313	N2KW	307	WD9IIX	296	K8NA	288	W9NUF	280
ON4QX	318	N4MM	313	SM6CTQ	306	N8MC	295	W6YQ	287	HB9AFI	279
K6JG	318	W2FXA	312	K3UA	306	W9WAQ	295	G2FFO	287	DL1QT	277
SM6CST	317	K6EC	312	K9IW	305	W0HZ	295	WA4DAN	287	KA3R	276
DL1PM	317	OK1MP	312	AB4H	304	N5FW	294	W9SC	287	W6DN	276
W6PT	316	SM3EVR	312	W6SN	304	K9BWQ	294	NN4Q	286	DJ2PJ	276
N4PN	315	YU1HA	312	W0IZ	303	IT9TQH	294	K4CXY	286	NS7Z	276
DL7AA	315	N6AR	311	WA8DXA	302	NN4O	293	I8WY	286	K2JF	275
N6AV	315	DJ1XP	311	YU2TW	301	WD9IIC	292	G2GM	286	K4SE	275
K6LEB	315	W6ID	311	I3OBO	301	IT9ZGY	292	W1WAI	283	W3BBL	275
W1NG	315	K9QVB	311	WB4RUA	300	K2OWE	292	JH1VRQ	282	G3KMQ	275
W4BQY	315	K4XO	311	W0SR	300	N5DX	291				

SSB

N4JF	319	I8KDB	315	K1UO	310	XE1KS	303	HP1JC	297	PA0XPQ	287
K6WR	319	K9LKA	315	KU9I	310	W2LZX	303	YU7KV	297	F6BFI	287
DL9OH	319	ON5KL	315	W6SN	310	KB0U	303	XE1OW	297	N8BJQ	286
F9RM	319	OZ8BZ	315	N6AHV	310	KB3OQ	303	WA4ECA	297	VE6PW	286
W6EUF	319	K9AB	315	KB9OC	310	K0GT	303	KS0Z	297	N3ARK	286
VE3MR	319	N6AW	315	W8IMZ	310	K1MEM	302	WB3GPR	296	N9CPW	286
W4UG	319	K1UO	315	K2JLA	310	N5FG	302	KB3KV	296	K9MNT	285
OZ3SK	319	K9BWQ	315	NY5L	310	W6FET	302	I0SGF	296	KB5RF	285
K2FL	319	YV5DFI	314	IV3YRN	310	I3OBO	302	K8NWD	296	I8IGS	285
DJ9ZB	319	VE3XN	314	WZ4I	309	K9UAA	302	W0IYR	295	KD8V	284
ZS6LW	319	YS1RRD	314	N4PN	309	KP4EQF	302	KK0C	295	KC7EM	284
I8AA	319	K8LJG	314	ZL1BIL	309	N5FW	302	G3XTT	295	KB2MY	284
YU1HA	319	W3GG	314	WD9IIX	309	I5EFO	302	W6MFC	295	WB3HAZ	283
TI2HP	319	I2LLD	314	K9QVB	309	KQ9W	302	VE3XO	295	VE3MV	283
W4NKI	318	W1NG	314	W2FGY	309	I2MQP	302	K4LR	295	IN3ANE	283
4Z4DX	318	W1LQQ	314	KR9O	309	K4CXY	302	XE1MDX	295	ZP5JCY	283
W4DPS	318	W8JXM	314	WB3DNA	309	WD8PUG	302	WA2FKF	295	CX4HS	283
W0YDB	318	SM4CTT	314	VK4VC	308	I8XTX	302	KI3L	295	AE5B	282
ZL3NS	318	W7FP	313	YV5AIP	308	KE4HX	302	IK8BQE	295	AI9R	282
W9DWQ	318	EA4LH	313	N6AV	308	WA3HUP	301	WD0BNC	294	TG9EP	282
VE1YX	318	W8PCA	313	N4KG	308	VE3FJE	301	I5BDE	294	N1ALR	282
W4EEE	318	N2SS	313	I8KCI	308	WB4NDX	301	K1VHS	294	WA8YTM	281
VE3GMT	318	VE7WJ	313	IT9TGO	308	W9OKL	301	WB3CQN	294	F6BFI	281
W9JT	318	K4XO	313	AI8M	308	YU2TW	301	SM6CST	294	K9TI	280
ZL1AGO	318	N6AHU	313	NS7Z	308	N4CRU	301	VE3DLR	294	ZL1BOQ	280
K6YRA	318	OE2EGL	313	VE7DX	308	KZ0C	301	K4JLD	293	G4FAM	280
KS2I	318	W7OM	313	YV1AJ	308	N8BKF	301	KB8O	293	KU9Z	280
PY1APS	318	F2MO	312	NN4Q	308	WT4T	301	K4SE	293	XE1XM	280
YV1KZ	318	W0SD	312	WA4DAN	308	KB2HK	301	KC8JH	293	WD9IIC	280
N4MM	317	K9RF	312	W8ILC/QRPp	308	K7LAY	301	AI5I	293	W9VA	280
I0ZV	317	K4MQG	312	WB1DQC	307	AG9S	301	W9NUF	293	KB5DN	279
DJ1XP	317	K9HDZ	312	I0MBX	307	KB9KD	301	G4GED	293	EA6DE	279
K9MM	317	LA7JO	312	KV2S	307	K2JF	301	KD5ZM	293	JH8NYK	279
KD8VM	317	LU3YL	312	VK3JF	307	W0ULU	301	WB6OKK	293	KX5V	279
W2SUA	317	G4CHP	312	NJ2C	307	W4BQY	301	W5LLU	293	K4BYK	278
CT1FL	317	N6OC	312	VE4SK	307	VE4AT	300	WA4LOF	292	VE3IUE	278
N7RO	317	K3UA	312	KA9ABC	307	I1POR	300	AC0A	292	KG9N	278
W0SFU	317	W6DN	312	W4UNP	307	SV8CS	300	VE3FEA	292	WB0UFL	277
OE3WWB	317	9H4G	312	WA2MID	307	G4GED	300	VP9CP	292	W4PTT	277
VE2WY	317	VE3MRS	312	K9HQM	307	WB5TED	300	W8LKG	292	KB0SY	277
YU1AB	317	W4SSU	311	N4KE	306	I2ZGC	300	SV1JG	292	KB7VD	277
N4WF	317	K6EC	311	KC8EU	306	NW5K	300	WD9GQV	292	WD0DMN	277
K6JG	317	I4LCK	311	KB5FU	306	WB6GFJ	300	VE3IPR	291	N0AMI	276
K5OVC	316	W0SR	311	K8CMO	306	JH1VRQ	300	W4JFE	291	N7ASL	276
I0AMU	316	K8NA	311	XE1OX	306	WB6PSY	300	DU9RG	291	WA4OPW	276
W3AZD	316	NJ0C	311	KE3A	306	IT9TQH	300	XE1CI	291	KC2RS	276
OA4OS	316	N2KW	311	W6NLG	306	WA2FKF	299	VE3CKP	290	WA9IVU	276
OK1MP	316	W2CC	311	K3LUE	306	WA0TKJ	299	IK8CNT	290	WA9RCQ	276
W9SS	316	K9IW	311	W6BCQ	306	I6PLN	299	KC2FC	290	K0HQW	276
IT9ZGY	316	WB4UBD	311	NA5W	305	KA8T	299	JA5PUL	289	I2WZX	276
EA2IA	316	AI8S	311	KZ8Y	305	DJ7CX	298	W9TA	289	KB1JU	276
I8ACB	316	KZ2P	311	K8VFV	305	K9SM	298	G4ADD	289	WB1EAZ	275
OZ5EV	316	KB8DB	311	EA1QF	305	I8LEL	298	AI9U	289	VE7BSM	275
K8PYD	316	I4EAT	311	K4RIG	305	JH4PRU	298	KA3HXO	288	VE5FX	275
DL6KG	316	DK2BL	310	K8ZZU	305	EA9IE	298	OK1AWZ	288	KE4VU	275
W8ILC	316	AA6AA	310	I4WZK	305	XE1HI	298	WA6DTG	288	I2EOW	275
XE1AE	315	WA4JTI	310	W4UW	304	K4LR	298	EA3KW	287	W0FF	275
I8YRK	315	AB9O	310	KB4HU	304	WE2L	297	AB9E	287	I8INW	275
N6AR	315	WA4WTG	310	KC8YM	304	K5DUT	297	W9SC	287	PY2DBU	275
I4ZSQ	315	WD8MGQ	310								

Say You Saw It In CQ

But it does show that you can do something with not very much if you persist.

The "Balanced Modulator" of the North Florida DX Club recently ran a chart copied from the "Communications Bulletin" of the Bell Telephone Pioneer's Radio Club. It might give some idea of the benefits of either boosting your power with an amplifier or boosting your signal with a beam. In the chart a 180 watt amateur rig was the gear and a dipole assumed as the antenna.

Power	Gain Needed	Power Incr.
180w.	0 dB	0%
227	1	25
285	2	60
359	3	100 (2X)
452	4	150
569	5	200 (3X)
717	6	300 (4X)
902	7	400 (4X)
1136	8	500 (5X)
1274	8.5	600 (6X)
1430	9	700 (7X)
1800	10	900 (9X)
2853	12	1500 (16X)
3591	13	1900 (20X)

For example, is a tribander with a rating of 8.5 dB better than a 1 KW linear? The chart indicates 8.5 dB equals a 600% power increase, a seven-fold increase. This indicates that the beam would beat the linear by 274 watts. A good ground would add more dBs, as much as three or four, while 10 more feet of antenna height would add 1 dB. Any obstruction to the antenna, a building or a hill, would deduct from the overall gain.

What does it mean? A good antenna and a good ground will often get you more than just added power. Upgrade your antenna system first, then think linears. More than one DXer learned all this the hard way. Then cover both possibilities.

VU7/8Q7

There have been reports that something might happen in the Maldives and the Laccadives early this year and extend into February and, as some of the schedules were slipping, it might be timely to listen for them even now.

A group of VU amateurs was aiming for a VU7 Laccadives effort around the turn of the year. The plan was to operate until March 31st. Last fall they did have the necessary permission, but because of some national emergencies where their communication skills were needed, they did not go. They rewrote their plans, aiming to show in late December for a run to the end of March.

For 8Q7 Maldives, DF2FQ and DK9FN were aiming to be active during February. There were also some reports that the Andamans would be activated, but when or by whom was not known.

Bulletin Boards

For those who have worked or heard Andy, 9M8PV, the above photo shows his great station. QSL info: Andy Lingham, ENG/2 M.L.N.G., P.O. Box 89, 97007 Bintulu, Sarawak, East Malaysia. (Photo via Jack, W2LZX)

will operate during evening hours with the planned starting date early this year. If you are interested, write to the "DX Bulletin," Box 50, Fulton, CA 95439. There will be a small charge for the service. "The DX Bulletin" currently has a 24-hour FAX number—(707) 523-0852.

The Space Environment Services Center (SESC) at Boulder's Space Environmental Laboratory has a computer bulletin board that allows access to the SESC daily solar-geographical reports and the forecasts. The number is (303) 497-5000. It is also noted that those who subscribe to CompuServe can obtain the daily, monthly, and yearly sunspot counts plus other information about solar happenings through that service.

Marion Island

The possibility of activity from Marion Island has been previously mentioned. It does seem that come April ZS6PT will be on the weather outpost for a 14-month tour. If all goes as planned, Peter will operate a full-service amateur station, offering SSB, CW, 6 meters, and satellite. He also plans to use the antennas in place on the island, these being rhombics, for the high frequencies. Some reports say the call will be ZS2MI, while some say it will be ZS8MI. If you need Marion Island, something may be heard before long. QSLs will be handled by ZS5E or WA3HUP.

South Shetlands

EA4YW will spend the rest of the Antarctic summer on Livingston Island in the South Shetlands on a three-month tour starting in early January. He will be signing EA0BAE, and you should watch for him on CW at 7 kHz up from the bottom of the band on 40 to 15, and 7043/14233 or 21245 kHz for SSB. QSL to Elias at Box 220, 28080 Madrid, Spain. EA0BAE will be at the Juan Carlos I base.

Phone Test comes the first weekend in March. There are also a number of others that one should not miss. Get the full list in Frank Anzalone's current column. After all, April might be a better month for gardening. It comes in between the *CQ* WW WPX Phone Test in March and the *CQ* WW WPX CW Test the last weekend in May. Plan, Plan! It always helps when one plans things carefully.

The North Jersey DX Assn. has new leadership. Eileen Holmes, K2AGJ, takes over as president. Ron Levy, K2AIO, is the vice-president, and Dick Nescot, WA2WDJ, is the treasurer. All of the rest of the club chores are handled by Bill Hellman, NA2M, the new secretary, and secretaries are always hard working. They have to be. K2AGJ is a familiar callsign. Eileen is often remembered for activities on the YL-SSB System.

There are nominations out for officers in the International Amateur Radio Union, and Richard Baldwin, W1RU, has been nominated for another term as president, a post he has held since 1982. Nominated for vice-president is Michael Owen, VK3KI. His election will mark the first instance of anyone outside of North America ever holding office in the IARU.

Prior to his first term starting in 1982, W1RU held the secretary's post in the IARU from 1976 to 1982. You might also recall him as the general manager of the ARRL. Michael Owen, VK3KI, served four years as president of the Wireless Institute of Australia and has been a director in Region 3 of the IARU since the inception of that region. He was a member of the Ad Hoc Committee doing the preparatory work for the 1979 WARC and has served on the IARU Administrative Council. He also holds the callsign of G3ZML.

In recent years there has been more talk of an early WARC, this to come in the early nineties. For the 1979 WARC there were years of preparation and amateurs did well, coming

CQ DX Awards Program

SSB

1646	KA0ZFX	1648	NR9S
1647	KA4TMJ	1649	JA1IT

CW

737	W3BBL

SSB Endorsements

310	TI2HP/319	300	W6NLG/306
310	DJ9ZB/319	300	KE4HX/302
310	ZS6LW/319	300	VE2PJ/302
310	I8AA/319	300	G4GED/300
310	K6JG/317	275	WA2FKF/299
310	DL6KG/316	275	WE2L/297
310	W8ILC/316	275	IK8CNT/290
310	W7FP/313	275	IK8GCS/280
310	G4CHP/312	150	JA1IT/163
310	WB4UBD/311	Mobile	KA0ZFX
300	W8ILC/QRPp/308		

CW Endorsements

310	K6JG/318	275	W3BBL/275
310	DL1PM/317	275	G3KMQ/275
310	DL3RK/314	250	

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City _____ State _____

ZIP _____ Phone ___( )_____

Sign Here _____

away with the 10/18/24 MHz segments. The IARU and its member societies are preparing for the next one and are determined to preserve the amateur privileges. Years back there was concern about threats to the HF bands, keeping in mind, for example, that 20 meters used to run to 14.400 MHz. It does seem that while the danger to the HF frequencies has lessened, it has not vanished but moved to threaten the UHF and VHF areas. Just recall the recent raid on 220 MHz. While perhaps not known as well as other amateur organizations, the IARU occupies a vital spot in protecting the amateur interests. Maintain a knowledge of their work.

In this area it might be noted that in the last Congress, there was a rider on the FCC budget bill, this passed by both houses of Congress, which advised the FCC to avoid harming the Amateur Radio Service. While this did not slow the 220 MHz matter, it did run up a signal that someone is watching out for the Deserving, and other worthy causes.

The elections for the Directors in half the ARRL Divisions did not produce any big upsets. Only one incumbent, that the Vice-Director in the Rocky Mountain Division appears to have come up short. A number of the DXer types were returned to office, these including Tom Frenaye, K1KI, in the New England Division; Rush Drake, W7RM, in the Northwest; Edmond Metzger, W9PRN, in the Central; and Fried Heyn, WA6WZO, who was unopposed in the Southwestern. Also winning as a vice-director was Wayne Overbeck, N6NB, in the Southwestern Division.

The ARRL, effective February 1st, raised the cost of QSLing just a bit. A 2 pound package of cards going overseas now will cost you $2.00. You can still send 10 cards or less for $1.00. This is the first increase since the Outgoing QSL Bureau was established in 1976.

On the subject of late and overdue QSLs, Nancy, NK4U, who manages the two-letter prefix in the W4 QSL Bureau, notes that some have run aground there and are waiting for the QSL Managers to haul them off. These include cards for 3D6AN and 3D0AN (WK4Y mgr.), VQ9PG (WB4MTE mgr.), HP3XUH (KA4MVK mgr.), and HP1XOG (WA4TWS mgr.). If you need them, just wait. They are halfway to you.

The YLRL is celebrating its 50th Anniversary Year in 1989, and if you work 50 of the YLRL members, you are in line for a special award. ZD8JP will be on Ascension to early summer and is being found on both CW and SSB. The Colvins on their current trip made some 4000 QSOs and worked 133 DXCC countries as W6KG/5B4. From the British Sovereign Base they were signing ZC4ZR, and by this time they should have been heard from a good handful more of DX stops. They will be in the Middle East and East Africa for some more weeks, returning home for the big International DX Convention next month.

Should you need Turkey, TA23/N4EXR is on most days at 0300Z on 14232 kHz and at 1530Z on 21205 kHz. Glenn says that he will be in Turkey until the end of the year. There is a report that Malyj Vystoskij will be put on the air again this spring. The EP stations show often enough to keep hope alive. EP2DL often is on the ET DX Net around 14160 kHz. EP2HZ and EP2MKN have been working Russians, some obvious net operations, and often are heard at 14215 kHz at 1400Z and at 14155 kHz after 1500Z.

There is a report that ZL7AA, Bob Hyndman, often heard on Chatham, is a Silent Key. DF2WO will be heard out to Dakar this year, he being in Senegal on a four-year tour of duty.

Some say that you move up to recognizable DX standing when you put up a beam. Certainly the neighbors will recognize you. Others say you attain status when you subscribe to a DX bulletin. And some say it takes both. If you have not yet upgraded, think of: "Inside DX," published by N2AU at 436 No. Geneva Street, Ithaca, NY 14850; or "QRZ DX," published by W5KNE, Box 832205, Richardson, TX 75083; "The DX Bulletin," published at Box 50, Fulton, CA 95439; and "The Long Island DX Bulletin," Box 173, Huntington, NY 11743. Any one of these will supply a sample if you send an SASE. And any one of them will bring you happiness, stature, and DX! They are an essential ingredient for the DXer.

Back a bit, maybe even a couple of months, it was mentioned that the DK6XR application for country status for Rotuma (this back in 1982) was based on autonomy. We have since obtained a copy of the original application, and the application was based on the distance between the islands, not autonomy. The distance of 225s from Rotuma to the "main country" was the point named. 73, Cass, WA6AUD

QSL Information

A volunteer for work in the DX vineyards is Steve Hurst, KA7NOC, of Wendell, Idaho. A dedicated DXer, Steve is looking for duty as a QSL Manager for a few DX stations. If help is needed, write to Steve at Box 213, Wendell, Idaho 83355.

With the relaxing of things within the UA areas, back in November it was noted that RA9YD would help with needed USSR cards, country or oblast, if you send yours along with three IRCs—one coupon to forward the card, two for the airmail return. Part of the mail code was left off the address. The full address is: Valery Tyulyupin, Box 2535, Barnaul, 656057, USSR. This activity is allowed under the new rules.

All of these vital signs were compiled with a lot of help from W9LNQ, a Watcher of the Lonely Night.

A34KK to SM7PKK
AX9YG to G4JVG
CY0SAB to VE1CBK
CV0Z to CX2CS
FO0KP to OH2BAZ
FR4FA/J to F6FNU
FY5YE to OH0XX
GU0/WA2TMP to NS7F
HA9RE to HA8XX
IU2A to I2UIY
IU9ARI to IT9TQH
J6LAH to K4PHE
JY4MB to DJ3HJ
KH8/SM7PKK to SM7PKK
KP2A (CQ WW) to N6CW
OA7MP to K8LJG
OD5NL to F3SM
PJ2/W1BIH to W1AX
PJ9JT to W1AX
P40AU to WA6AUE
P40ZZ to KE7V
SU1EE to WA9INK
SU1EK to WA6OWU
SV9/DL4EBN to DL4EBN
T5GG to IK2EGL
T28RK to K8JRK
TP0CE (SSB) to F6FQK
TP0CE (CW) to F6FSQ
UB5ILA to N9CMB
UF6FJ to UA6FFF
UG7GWO to UG6GAT
UH9AWA to RW3AH
UH9AWB to UH8HAI
V47NXX to AA4FS
VK9ZM to NM2L
VK9ZW to NM2L
VP2E/K1TWF to K1TWF
VR1AA to GW3HCL
XE2GCK to AA6EE
YL2RG to UQ1GXX
ZB2X to OH2KI
ZC4ZR to YASME
ZD8JP to G3ATK
3A2VV to OH2BAZ
4K2YL to UW3TW
5UV386 to DJ6SI
5B4/W6KG to YASME
6Y5/K2BPP to KA2UHS
8P6DD to W4WET
9N8CC to JH8BKL
IU9ARI to M. Tramuto, Bx 18, Palermo 90100. Sicily, Italy
JY7HH to POB 1120, Amman, Jordan
LP2U to Box 116, Santa Rosa 6300, La Palma, Argentine
SZ2COT to No. Greece ARC, Box 11437, Thessaloniki, Greece
SV5TS to Box 251, Rhodes, CP85100, via Greece
UB5ILA to Phil Strack, 26571 W. Stonegate, Antioch, IL 60002
VE8CB to Box 500, Cambridge Bay, NWT, Canada X0E 0C0
XF4C to Box 231, Colima, Mexico
YL2RG to Box 265, Riga, 226050 Latvia, USSR
3D2XX to Ross Forbes, Box 11, Los Altos, CA 94023
3W8CW to Box 271, Vienna 1141, Austria
3W8DX to Box 271, Vienna 1141, Austria
8P6DD to Galen Justison, Box 1666, Ramona, CA 92065
9G1PP to D. Hewitt, PO-6-OR215, Accra, Ghana

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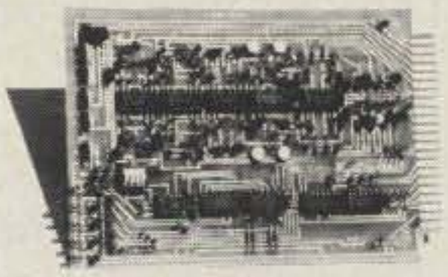

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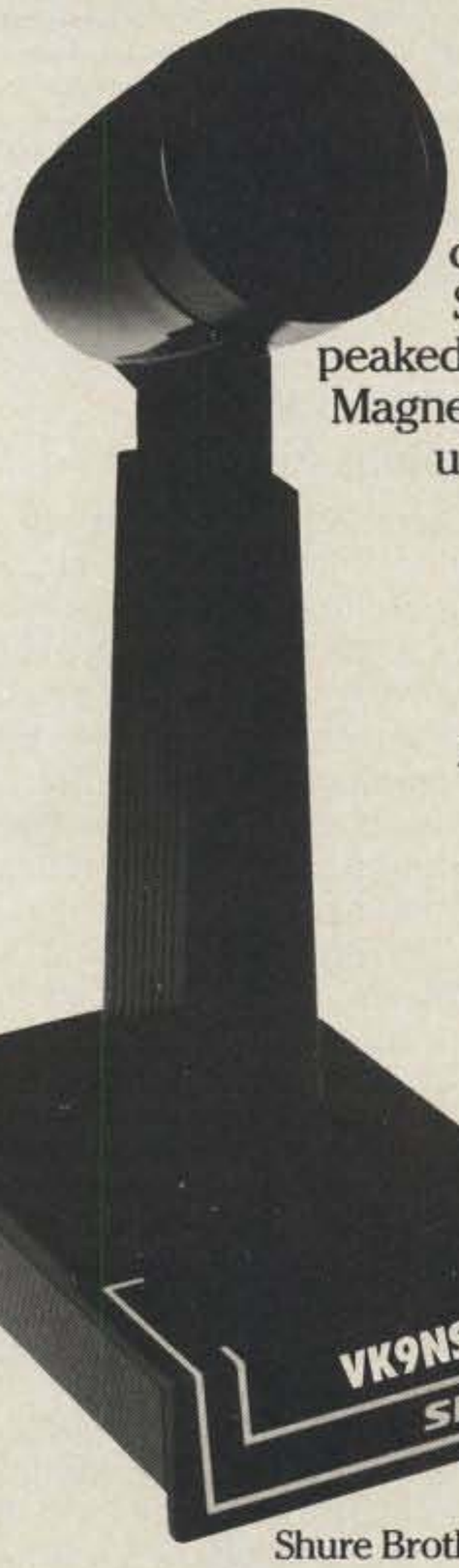

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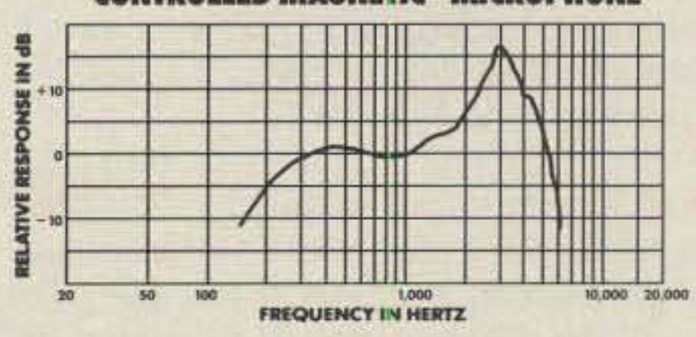

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CIRCLE 133 ON READER SERVICE CARD

Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Solar activity continues to increase rapidly. The Royal Observatory of Belgium reports a monthly mean sunspot number of 126 for November 1988. Daily levels varied between a low of 69 on November 27th to a high of 196 on the 17th. The Algonquin Radio Observatory in Ottawa, Ontario reports a corresponding increase in the 10.7 cm solar flux level. A median value of 156 was reported for November.

The median sunspot number for November results in a 12-month running smoothed number, on which cycle growth is measured, of 84 centered on May 1988. This is an increase of 6 in the count since the previous month.

The National Geophysical Data Center at Boulder, Colorado predicts a smoothed sunspot number of 148 (plus or minus 19) for March 1989.

CQ World-Wide DX CW Contest Critique

Conditions during the *CQ* World-Wide DX CW Contest weekend of November 26th and 27th, while generally good, were not as good as those observed during the Phone Contest weekend of the previous month.

The CW weekend occurred during a short period drop in solar activity. On November 26th the 10.7 cm solar flux level was 141, increasing slightly to 145 on the 27th. The respective daily sunspot counts were 80 and 69. On November 26th the geomagnetic field was mainly unsettled, with the mid-latitude A-index level at 19 and the high-latitude reading at 33. Between 1200 and 1500 UTC a minor level of radio storminess was reported at high latitudes, adversely affecting transpolar openings and paths traversing the higher latitudes. The geomagnetic field on the 27th was quiet throughout the entire world, with an A-index reading of 12 at mid-latitudes and 13 at high latitudes.

All in all, November 26th was rated Low Normal, while conditions on the 27th were rated High Normal.

Band openings followed closely the predicted patterns, but openings on both *10* and *15* meters were not as widespread nor for as long a duration as observed during the Phone Contest weekend. It was, nevertheless, a good weekend for the CW Contest, and this will very likely be reflected in the scores achieved.

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for March 1989

	Expected Signal Quality			
Propagation Index	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 1, 11, 25, 27	**A**	**A**	**B**	**C**
High Normal: 2, 7-9, 12-14, 18-19, 24, 26, 28-29	**A**	**B**	**C**	**C-D**
Low Normal: 3, 6, 10, 17, 23, 30-31	**B**	**C**	**D**	**D-E**
Below Normal: 4-5, 15-16, 20, 22	**C**	**C-D**	**D-E**	**E**
Disturbed: 21	**C-D**	**D**	**E**	**E**

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9+, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S0 and S3, and with considerable fading and noise.

E—No opening expected.
3 dB per S-Unit.

HOW TO USE THIS FORECAST

1. **Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.**
2. **With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be excellent (A) on March 1, good (B) on the 2nd, good-to-fair (B-C) on the 3rd, fair-to-poor (C-D) on the 4th and 5th, etc.**

Widespread 6 Meter DX Openings Reported

Ray Clark, K5ZMS, Secretary for the Six Meter International Radio Klub (SMIRK) confirms the increase in *6* meter F2-layer DX openings that were expected as the sunspot cycle soared into double-digit 10.7 cm solar flux values. Between early September and the end of 1988 an increasing number of openings have been reported between the U.S. and Japan, Central and South America, Africa, Europe, the South Pacific, and Australasia. W6UXN, an experienced *6* meter DX hand, reports that the openings between California and Japan on November 26th and 27th were the strongest he has ever heard. On November 30th VE1YX reported working 44 different European stations on *6* meters! Working All Continents (WAC) on *6* meters is already a reality, and the best is still ahead as the cycle continues to rise.

SMIRK also reports several *2* meter Trans-Equatorial (TE) DX openings between southern areas of the USA and Central and South America and between southern Africa and southern Europe.

For more detailed and updated information concerning *6* meter DX activity, write directly to SMIRK at 7158 Stone Fence, San Antonio, Texas 78227.

Thirty-Ninth Year!

This month's column marks the beginning of my 39th year as Propagation Editor for *CQ*. With the unprecedented rapid rise in solar activity it appears very likely that this may be a record year for HF propagation conditions.

In 1957, when sunspot cycle 19 was nearing a record peak intensity of 201, I wrote in this column about the "once in a lifetime" propagation conditions that were associated with that cycle. Well, it looks now very much as if I will be writing about "once in a lifetime" conditions for a second time in my life. Cycle 22, the present sunspot cycle, is tracking towards what may well be a new record high sunspot count. This may come about as early as December of this year, or during the early months of 1990. At present estimates the count may be as high as 210!

After 39 years my crystal ball may be a bit misty, my Ouija board a bit rusty, but I look forward with a great deal of enthusiasm to reporting this unusual cycle's progress, its effect upon propagation in the HF amateur bands, and the possibility of once-in-a-lifetime conditions again on the pages of this column during this, my 39th year as Propagation Editor.

March Conditions

It should be a toss-up between *10* and *15* meters for the best DX band during the daytime hours, with *20* meters not far behind. Exceptionally good DX is expected on all *three* bands from shortly after sunrise and until sunset. From sundown to midnight DX honors will likely be shared between *20* and *40* meters, with openings towards the west and the south also possible on *15* meters. Some fairly good *80* meter DX conditions are also expected during this period. From midnight to sunrise best DX bands should be *40* and *80* meters, with quite a bit of DX also possible on *20* and *160* meters. All in all March should be a great month for worldwide DX conditions on all shortwave bands. For more detailed information refer to the DX Propagation Charts which appeared in last month's column. This month's column contains Short-Skip Propagation Charts which are valid through March and April, as well as Propagation Charts centered on Alaska and Hawaii. The Short-Skip Charts contain band-opening predictions for predominantly one-hop

Say You Saw It In CQ

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip chart, the predicted times of openings can be found under the appropriate distance column of a particular Meter band (10 through 160 Meters) as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate Meter band column (10 through 80 Meters) for a particular geogcaphical region of the continental USA as shown in the left hand column of the Charts. An * indicates the best time to listen for 80 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occurr on more than 22 days
(3) " " " between 14 and 22 days
(2) " " " between 7 and 13 days
(1) " " " on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M. etc. On the Short-Skip Chart appropriate *standard time* is used at the *path midpoint*. For example on a circuit between Maine and Florida, the time shown would be EST, on a circuit between N.Y. and Texas, the time at the midpoint would be CST, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones *add* 2 hours in the PST zone; 3 hours in the MST zone; 4 hours in the CST zone, and 5 hours in the EST zone. *Add* 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 P.M. in Los Angeles; 17 or 5 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *standard* time in other areas of the USA *subtract* 8 hours in the PST zone; 7 hours in the MST zone, 6 hours in the CST zone and 5 hours in the EST zone. For example, at 20 GMT it is 15 or 3 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts c.w. or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave length above ground on 40 and 20 meters, and a wave-length above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level for each 10dB loss, it will lower by one level.

5. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Science of the U.S. Dept o Commerce, Bculder, Colorado, 80302.

paths, ranging in distance between approximately 50 and 2300 miles.

For day-to-day changes in shortwave propagation conditions expected during March, see the Last Minute Forecast, which appears at the beginning of this column.

During March and continuing into April relatively similar shortwave propagation conditions exist in the temperate regions of both the northern hemisphere (where it is spring) and in the southern hemisphere (where it is fall), as compared to the more extreme conditions that exist when it is summer in one hemisphere and winter in the other. This geographically widespread equalization in ionospheric conditions results from the equinox effect, as the sun crosses the equator on its apparent travels into northern skies. Similar conditions occur during September and early October as the sun travels into southern skies. The equinox effect results in DX conditions *between* both continents being at their best. Exceptionally good intercontinental DX conditions are therefore expected this month on all amateur bands from *6* through *160* meters at appropriate times. Typical of these openings are the paths between the United States and South America, Australasia and the central and southern regions of Africa and Asia, and Antarctica.

The best times to look for intercontinental openings are shortly *before* local sunrise and again shortly *after* local sunset on *40, 80,* and *160* meters; for an hour or two *after* sunrise and again from an hour or two *before* to an hour or so *after* local sunset on *20* meters; and during the daylight hours on *10, 15,* and *6* meters. During daytime openings signals should peak from the east and the south before noon, from the south during the early afternoon, and from the south and the west later in the afternoon.

VHF Ionospheric Openings

The combination of rapidly increasing solar activity and the equinoctial effect should produce exceptionally good F2-layer DX conditions on the *6* meter band. Openings should be possible from the USA to almost all areas of the world during the month, particularly when conditions are High Normal or better. Signals from the northeast to the southeast should peak by mid-morning. Noontime should be best for openings towards the

CQ Short-Skip Propagation Chart March & April 1989 Band Openings Given in Local Standard Time At Path Mid-Point (24-Hour Time System)

Band Meters	*Distance From Transmitter (Miles)*			
	50-250 Miles	250-750 Miles	750-1300 Miles	1300-2300 Miles
10	*Nil*	09-13 (0-1)	07-09 (1) 09-12 (1-2) 12-13 (1-3) 13-16 (0-3) 16-18 (0-2) 18-20 (0-1)	07-08 (1) 08-09 (1-2) 09-12 (2-4) 12-16 (3-4) 16-18 (2-3) 18-20 (1-2) 20-21 (0-1)
15	*Nil*	07-09 (0-1) 09-15 (0-2) 15-19 (0-1)	07-08 (1) 08-09 (1-2) 09-15 (2-4) 15-18 (1-3) 18-19 (1-2) 19-23 (0-1)	07-08 (1) 08-09 (1-3) 09-15 (4) 15-18 (3-4) 18-19 (2-3) 19-21 (1-3) 21-23 (1-2) 23-01 (0-1)
20	11-13 (0-1) 13-16 (0-2) 16-19 (0-1)	08-09 (0-3) 09-11 (0-4) 11-13 (1-4) 13-16 (2-4) 16-18 (1-4) 18-19 (1-3) 19-22 (0-2) 22-08 (0-1)	06-07 (1-2) 07-08 (3) 08-09 (3-4) 09-18 (4) 18-19 (3-4) 19-22 (2-4) 22-00 (1-3) 00-02 (1-2) 02-06 (1)	06-07 (2) 07-08 (3) 08-10 (4) 10-15 (4-3) 15-22 (4) 22-23 (3-4) 23-00 (3) 00-02 (2) 02-04 (1-2) 04-06 (1)
40	06-07 (1-2) 07-09 (2-3) 09-18 (4) 18-20 (3-4) 20-22 (2-3) 22-00 (1-2) 00-06 (1)	06-07 (2-3) 07-09 (3-4) 09-11 (4-3) 11-13 (4-2) 13-15 (4-3) 15-20 (4) 20-22 (3-4) 22-00 (2-4) 00-03 (1-3) 03-06 (1-2)	06-07 (3-2) 07-08 (4-2) 08-09 (4-1) 09-13 (2-1) 13-15 (3-1) 15-17 (4-2) 17-19 (4-3) 19-00 (4) 00-03 (3-4) 03-06 (2-3)	06-08 (2-1) 08-15 (1-0) 15-16 (2-0) 16-17 (2-1) 17-19 (3-2) 19-03 (4) 03-04 (3-4) 04-06 (3)

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Caribbean, Central America, and the northern countries of South America. During the afternoon hours expect *6* meter skip to extend deeper into South America and to shift towards the west and northwest. Exceptionally strong signals will occur at times. Trans-continental openings on *6* meters can be expected from approximately noon through the late afternoon hours.

Trans-equatorial scatter propagation (TE) usually improves considerably during the equinoctial period, and some *6* and possibly even *2* meter openings may be possible by way of this propagation mode during the month. TE openings must cross the magnetic equator at or near a right angle, and the best time for such openings is between 8 and 11 PM local time. Conditions favor openings between the southern tier states and the southern countries of South America, but some openings may be possible from northern states as well.

Auroral activity tends to peak during the equinoctial period, and there is a good chance for numerous VHF ionospheric short-skip openings by means of auroral-scatter propagation. Check the Last Minute Forecast at the beginning of this column for those days that are expected to be Below Normal or Disturbed, since these are the days on which VHF auroral openings are most likely to occur during March.

Short-skip openings due to sporadic-E propagation usually pick up a bit during March. An occasional *6* meter opening should be possible via this mode over distances between approximately 1000 and 1300 miles. Sporadic-E type short-skip openings can occur during the hours of darkness as well as during daylight, but during daylight they may be masked by the more powerful F2-layer openings.

Not much meteor activity is expected during the month, although some VHF meteor-scatter-type openings may be possible for brief periods during minor meteor showers which are expected to peak on March 15–16 and March 25–26.

73, George, W3ASK

80	07-11 (4) 11-18 (4-3) 18-22 (4) 22-00 (3-4) 00-07 (2-3)	07-08 (4-2) 08-11 (4-1) 11-16 (3-0) 16-18 (3-2) 18-20 (4-3) 20-00 (4) 00-05 (3-4) 05-07 (3)	07-08 (2-1) 08-11 (1-0) 11-16 (0) 16-18 (2-1) 18-20 (3-2) 20-03 (4) 03-05 (4-3) 05-07 (3-2)	07-08 (1-0) 08-16 (0) 16-18 (1-0) 18-20 (2-1) 20-22 (4-2) 22-03 (4-3) 03-05 (3-2) 05-07 (2-1)
160	05-07 (4-2) 07-09 (3-1) 09-17 (2-0) 17-19 (3-1) 19-20 (4-2) 20-05 (4)	05-06 (2-1) 06-07 (2-0) 07-09 (1-0) 09-17 (0) 17-19 (1-0) 19-20 (2) 20-22 (4-3) 22-03(4) 03-05 (4-3)	05-06 (1) 06-19 (0) 19-20 (2-1) 20-22 (3-2) 22-03 (4-3) 03-05 (3-2)	05-06 (1-0) 06-19 (0) 19-20 (1-0) 20-22 (2) 22-03 (3-2) 03-05 (2-1)

HAWAII
March & April 1989
Openings Given in Hawaiian Standard Time

TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	08-09 (1) 09-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-08 (2) 08-11 (1) 11-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-21 (4) 21-00 (3) 00-04 (2) 04-06 (3) 06-07 (2) 07-08 (1)	18-20 (1) 20-22 (2) 22-01 (3) 01-02 (2) 02-03 (1) 21-22 (1)* 22-01 (2)* 01-02 (1)*
Central USA	08-09 (1) 09-11 (2) 11-15 (3) 15-17 (4) 17-19 (2) 19-20 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-14 (2) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	09-14 (1) 14-16 (2) 16-19 (3) 19-23 (4) 23-03 (3) 03-06 (2) 06-08 (3) 08-09 (2)	19-20 (1) 20-22 (2) 22-02 (3) 02-04 (4) 04-05 (2) 05-06 (1) 22-23 (1)* 23-02 (2)* 02-03 (3)* 03-04 (2)* 04-05 (1)*
Western USA	08-09 (1) 09-11 (2) 11-12 (3) 12-16 (4) 16-17 (3) 17-19 (2) 19-20 (1)	06-07 (1) 07-09 (2) 09-11 (4) 11-15 (3) 15-18 (4) 18-20 (3) 20-21 (2) 21-23 (1)	15-17 (3) 17-21 (4) 21-00 (3) 00-02 (2) 02-04 (1) 04-06 (2) 06-08 (4) 08-10 (3) 10-15 (2)	18-19 (1) 19-21 (2) 21-22 (3) 22-04 (4) 04-05 (3) 05-06 (1) 21-22 (1)* 22-23 (2)* 23-04 (3)* 04-05 (2)* 05-06 (1)*

ALASKA
March & April 1989
Openings Given in GMT

TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	20-22 (1) 22-00 (2) 00-01 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-01 (2) 01-02 (1)	13-15 (1) 20-22 (1) 22-01 (2) 01-03 (3) 03-05 (2) 05-06 (1)	06-13 (1) 07-12 (1)*
Central USA	20-23 (1) 23-01 (2) 01-02 (1)	18-20 (1) 20-23 (2) 23-01 (3) 01-02 (2) 02-03 (1)	14-16 (1) 20-23 (1) 23-02 (2) 02-04 (3) 04-05 (2) 05-07 (1)	07-14 (1) 08-12 (1)*
Western USA	20-23 (1) 23-00 (2) 00-02 (3) 02-03 (2) 03-04 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-02 (4) 02-04 (3) 04-05 (2) 05-06 (1)	16-18 (1) 18-20 (3) 20-00 (2) 00-02 (3) 02-04 (4) 04-05 (3) 05-06 (2) 06-10 (1)	7-09 (1) 09-12 (2) 12-14 (1) 09-10 (1)* 10-12 (2)* 12-13 (1)*

See explanation in "How To Use Short-Skip Charts" in box at the beginning of this column.

* Indicates best time for 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a propagation index of (2), or higher.

Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.

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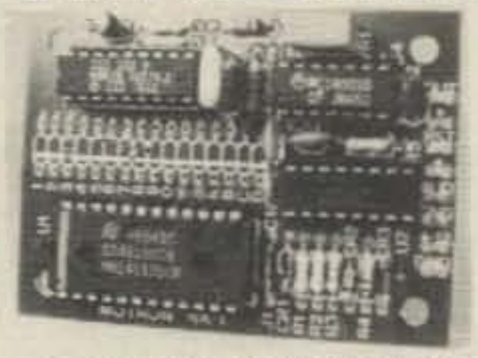
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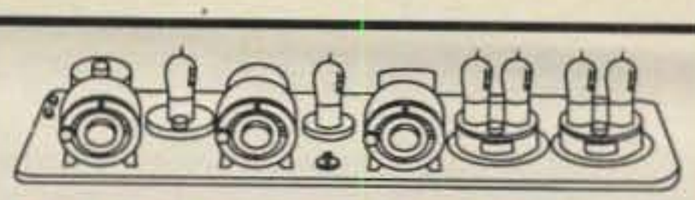

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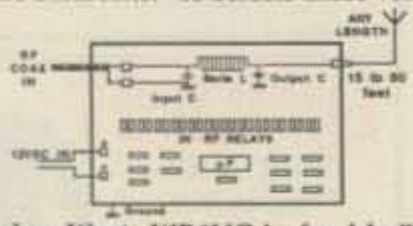

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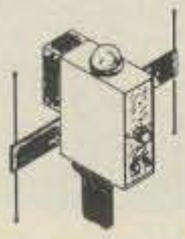

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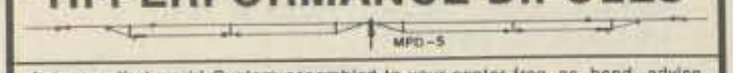

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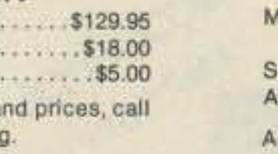

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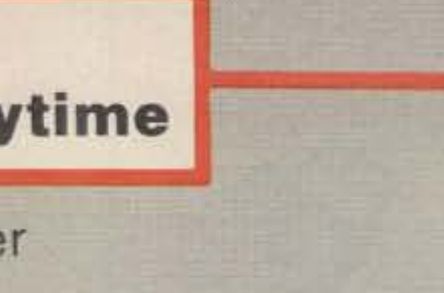

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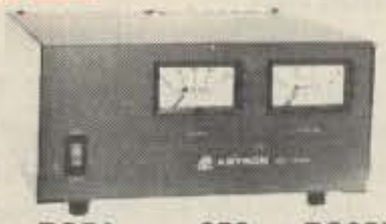

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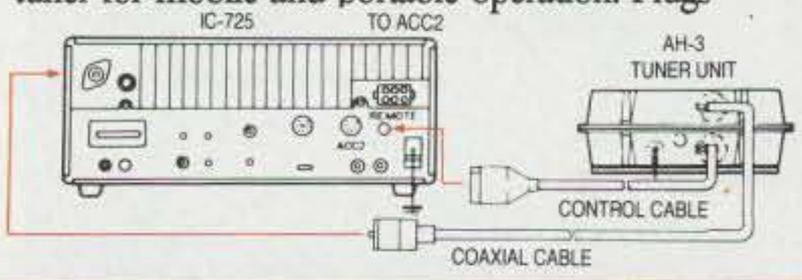
Full Featured Operation! 26 tunable memories with Band Stacking Registers which enable you to store a frequency, switch bands, and return to the stored frequency • 10Hz digital frequency display • Three tuning rates • Three scan modes • Highly effective Noise Blanker • RIT • Semi-QSK CW • Optional narrow CW filter • Built-in AH-3 controller • IC-725 measures only 9.0 x 3.7 x 9.4 inches (H, W, D).

Optional AH-3 automatic and remote antenna tuner for mobile and portable operation. Plugs directly into the IC-725. Wide impedance matching range. Mating whip unit (AH2-B) bolts to auto's frame, works 80-10 meters.



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CIRCLE 82 ON READER SERVICE CARD

YAESU'S DUAL BANDER GOES PLACES OTHER MOBILES DON'T.

FT-4700RH control head (1 15/16" x 5 7/8" x 1")

Introducing Yaesu's FT-4700RH dual-band mobile. Choose Yaesu's FT-4700RH, and you open the door to a lot of tight spaces.

While other dual banders just won't fit in today's small cars, the FT-4700RH utilizes a versatile "remote head" design. So you can mount the "brains" on your dash, visor, or door, and hide the "muscle" under your seat.

High-performance package. Packing a solid 50-watt punch on 2 meters (40 watts on 70 cm), the FT-4700RH includes Dual-Band Watch for simultaneous monitoring of both bands, with independent squelch settings on the main and secondary bands. When you transmit, opposite band monitoring goes on in a full-duplex mode.

You can adjust the relative volume of the two receive channels with the balance control, too. And with Yaesu's bright LCD display, transceiver status is clearly visible in sunlight or shade.

Convenience on the road. Human engineering, long a Yaesu specialty, is an important aspect of the FT-4700RH design. The ten-button front panel keypad includes a "do-re-mi" audible command verification, and all important controls are backlit for night operation. Plus you get extended receive coverage of 140-174 MHz (MARS/CAP permit required for transmit on 140-150 MHz), or 430-450 MHz on 70 cm. Nine memory channels on each band. High/low power selection (low power: five watts). One-touch reverse repeater shift button. Optional CTCSS module. And 16-key DTMF microphone.

Optional accessories. FTS-8 CTCSS unit. MH-15D8 Autodialer Microphone with 10-telephone number memory. SP-3 or SP-4 External Speakers. And YH-1 Headset/Boom Mic or MF-1A3B Flex-Arm Boom Mic, both with SB-10 PTT Switch Unit.

Discover Yaesu's FT-4700RH today. And see what "high performance" really means. For dual-band mobile operation, Yaesu's FT-4700RH really fits!

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. **Repair Service:** (213) 404-4884. **Parts:** (213) 404-4847. Prices and specifications subject to change without notice. Specifications guaranteed only within amateur bands.

YAESU

CIRCLE 22 ON READER SERVICE CARD